ROCKS and MINERALS
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PETER ZODAC

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Contents for September-October, 1949

CHIPS FROM THE QUARRY 450
MUSICAL SAND: A REVIEW OF THE LITERATURE.
By G. H. Goodenough 451
MRS. ALLEN OPENS FLORIDA MUSEUM 454
A DAY AT THE BILBAO MINE, ZACATECAS, MEXICO.
By Louis W. Vance 455
SECOND REPORT ON UNUSUAL LIMONITE FORMS FROM VAN BUREN CO., MICH. *By Jeff Hill* 458
ROCKHOUND HEAVEN (A POEM). *By French Morgan* 461
A TRIP TO CRYSTAL RIVER, FLORIDA. *By Mrs. Rena Allen* 462
QUEEN OF FLUORESCENT MINERALS (T.O.L.) 465
TRIP TO MEXICO, PART 3. *By Peter Zodac* 466
MINERALS. *By William C. Casperson* 476
LET ME TAKE YOU ON A ROCK TRIP. *By A. A. Porter* 478
OUR TRIP TO THE YARRANGOBILLY CAVES, AUSTRALIA.
By N. H. Seward 479
AN UNUSUAL MINERAL SPECIMEN FROM NEAR RAVENA, N. Y.
By H. V. Hamilton 481
NO. JERSEY SOCIETY VISITS ROXBURY STA., CONN.
By Katherine B. Kauth 482
BIBLIOGRAPHICAL NOTES 485
RAMBLING OF A ROCK HOUND. *By R. F. Henley* 486
FLUORESCENCE AND OUR FLAG. *By Ruth H. Wentworth* 488
TEKTITE OCCURRENCE IN AUSTRALIA. *By H. H. Batchelor* 490
PART OF HISTORY OF COLLECTING AT PATERSON, N. J.
By W. H. Hayes 491
NOTES ON THE ECTON MINE, MONT. CO., PENN. *By A. J. Boucot* 492
THE GILLETTE QUARRY, HADDAM NECK, CONN. *By Helen Stobbe* 496
HUGE PETRIFIED TREE FOUND IN SOUTH DAKOTA 502
WEST ROCK TUNNEL, NEW HAVEN, CONN. (T.O.L.) ..... 481 and 503
THE MICRO MOUNTER. *Conducted by Leo N. Yedlin* 504
THE INSIDE STORY OF TITANIA. *By T. Orchard Lisle* 506
COLLECTOR'S COLUMN. BERYL 507
CLUB AND SOCIETY NOTES 508
SERMONS IN THE ROCKS. *By Constance P. Trott* 516
INDEX TO ADVERTISERS 560

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CHIPS FROM THE QUARRY

Copy Lost in Mails

Our most popular feature, "World news on mineral occurrences", does not appear in this issue due to the fact that it reached our printers too late. Although the copy, along with others, was dispatched in time, it got lost in the mails. The printers received it before the magazine went to press but by that time it was too late. The feature will appear in the next issue and we do hope that copy sent to the printers may never get lost again.

Our printers, the Kimball Press, are located in Warren Point, N. J.

Boy! Some Advertiser!

Editor R&M:

You should soon get $3.00 from a Mr. Timmerman in K.C., Kans. Boy, am I advertising your magazine! Wish I had heard of it years ago.

James L. Romig,
Sept. 1, 1949 Kansas City, Mo.

Mineralogy Gives Much Pleasure!

Editor R&M:

The pleasure I have benefited from being a subscriber of R&M and having your advice and cooperation in getting started off on the right foot in this interesting science of Mineralogy, can never be matched. Your book, *"How to collect Minerals,"* has been a guide to me in many ways and its value cannot be estimated. This, too, adds to our sincere friendship and indeed to my obligation to you and your interest you have so willingly shared with me. I have also been much blessed in this new hobby science, by the contact with so many grand people, who have come into my life, and given so much cheer in same. There is no other life's contact that gives one more pleasure in all its phases than Mineralogy does.

Waldo E. Ford
Wesson, Miss.
August 9, 1949

Instills Desire To Travel!

Editor R&M:

I am enclosing $3. for a further year's subscription to your grand magazine. Incidentally, I believe you should be well subsidized by travel agencies and gasolene companies. I know of no magazine which instills in me such a desire to travel when I read the articles on mineral locations.

M. N. Pringle
Toronto, Ont., Canada
Aug. 8th, 1949

Club Appreciates Write-Ups!

Editor R&M:

On behalf of the members of the Chicago Rocks and Minerals Society I wish to express our sincere thanks and appreciation for the cooperation and publicity you have given us during the past year. Your magazine is read with much enjoyment and the members always sight the write-ups you publish for us in your very fine publication.

Chicago Rocks and Minerals Society
Helen L. Cooke, Corres. Sec.
Chicago, Ill.
July 18, 1949

Ad Brings Good Results!

Editor R&M:

Please kindly pardon the delay in thanking you for your kindness and thoughtfulness in placing the ad concerning my husband's Construction Kit in *Rocks and Minerals*.

We have had many returns from all parts of the United States (so it seems) and some parts of Canada through your excellent presentation of the Kit, especially in the BIBLIOGRAPHICAL NOTES. The Kit is definitely going places—even Holland.

My husband is finishing up his Master's thesis problem, and he hopes to receive his Degree in September. When we are certain just where we shall be in the near future, then you may be sure that we shall contact you again with a view to placing another ad in your excellent magazine. I do mean what I say about your magazine. It *is* good!

Mrs. Arthur James Gude, 3rd.
Golden, Colorado.
Aug. 6, 1949

REPRINTS AVAILABLE

There have been so many requests for reprints lately that the following bit of information may be of value. They can be supplied and at the following rates:

100 copies	2 pages		$ 3.75
100 "	4 "		7.25
100 "	6 "		10.25
100 "	8 "		12.75
100 "	10 "		15.00

All reprints must be ordered in advance, before the articles make their appearance in print.

ROCKS and MINERALS

PUBLISHED MONTHLY

Sept.-Oct. 1949

Edited and Published by PETER ZODAC

MUSICAL SAND: A REVIEW OF THE LITERATURE

By GLENN H. GOODENOUGH

University of Southern California

ABSTRACT

Musical sands are of common occurrence and widely distributed. Their acoustic properties vary from the whistle of beach sands to the booming tone of some desert sands. There is as yet no real explanation of the mechanism by which the sounds are produced. The writer cites the theories of various workers on the problem, also some locations of musical sands around the world.

INTRODUCTION

A careful search through the literature shows that allusions to sonorous sands are scattered throughout the writings of centuries. A reference to the phenomenon occurs in "Tales of the Arabian Nights". Old Chinese chronicles mention sonorous sands occurring in the desert of Lob-Nor, Marco Polo narrates superstitions concerning it, the Emperor Baber refers to a locality in Afghanistan, and many travelers in the far East describe hills of moving sand from which issue mysterious noises. (3).

Much material has been written on the subject but actual analytical work in the field and laboratory has been done by a mere handful of scientists, among whom are Cecil Carus-Wilson, Alexis A. Julien, H. C. Bolton, and R. A. Bagnold. Between the years 1882 and 1889, Julien and Bolton covered a wide area of the globe in their work on this and related subjects. They presented numerous papers on "singing sands" before the leading scientific societies of their day.

The actual source of the acoustic properties of these sands has not yet been discovered but the writer has attempted to assemble what knowledge can be gleaned from the work done without going into the technical details of the experiments performed.

DISTRIBUTION

Musical sand is not a rarity but is of common occurrence and is widely distributed. About seventy-four American and eighteen foreign localities were known as far back as 1884 and this as a result of only a very limited survey.

One of the most famous localities of singing sand is at the Jebel Nagous or "Mountain of the Gong" in Arabia. The Arabs tell of weird sounds issuing from this mountain, loud and wild during storms, and low and musical during more quiet weather. Ehrenburg visited the place in 1823 and Hugh Miller in 1850. Dr. Bolton organized an expedition to visit the mountain in 1883. After four days travel through the desert they camped at the base of the hill which was about 950 feet high. Dr. Bolton heard the music which was a song of several notes rising and falling, with one continuous undertone, like an organ note. He soon ascertained the cause. The winds continually blow the sand up the sides of the hill, and as it rushes up the slope it emits a multitude of tiny tinkling notes, which when combined, make a considerable volume of noise. Then the continuous returning flow of sand gives out the steady undertone, increased by the echo from a sandstorm cliff. (18)

On the coast of Massachusetts, near Manchester, singing sand is confined to the portion of sand lying between the water line and the loose sand above the reach of ordinary high tide. Portions of this area emit the sounds but closely contiguous areas do not or do so feebly. The sounding sand is near the surface; at the depth of a few inches it ceases, perhaps because of moisture. The sound occurs when sudden pressure is applied to the sand as by walking on it or dragging ob-

jects across it. (6)

On the south coast of the Island of Kauai in the Hawaiian group, there is one particular sand dune, more symmetrical in shape than others, with the appearance of a broadened, truncated cone. The sands on the top and the landward side of this dune possess remarkable acoustic properties, similar to the bark of a dog. The angle of the slope of the dune is uniformly 31° and its sand is remarkably mobile when perfectly dry. When disturbed it rolls in wavelets down the slope emitting a deep base note which at times resembles the hum of a buzz saw in a planing mill. Vibration can be felt in the hands or feet of persons disturbing the sand, even through shoes. The magnitude of the sound is dependent upon the quantity of sand moved, and probably to a certain extent upon the temperature. The drier the sand the greater the amount possessing mobility, and the louder the noise. (11)

On a farm near the southeastern border of the Kalahari desert in South Africa there is an area of singing sand which is one of the most remarkable in the world. It consists of a patch of whitish dunes about a mile wide and six miles long. The sound of a man sliding down a slope can be heard six hundred yards away. Even when a dog runs across the dunes a rumbling sound can be heard. The sands roar at every footstep and when a finger is pushed into the sand a snoring sound is heard which becomes an octave higher when the finger is withdrawn. (17)

Singing sands have been found on inland lake and river beaches as well as deserts and sea shores. Good examples have been found on the shores of Lake Michigan, Lake Huron, and the western shores of Lake Champlain; also along the Wisconsin River, the Mississippi River, and the Cape Fear River in North Carolina.

Musical sands may be found in California at Santa Barbara, Monterey, and Coronado Beach, San Diego, and also at Cape San Lucas at the tip of Lower California. (13)

These peculiar sands are, no doubt, to be found at thousands of places throughout the world and the localities cited are merely a few of those mentioned most frequently in the literature .

PROPERTIES

Although there is as yet no valid explanation of the mechanism by which the sounds are produced, several theories have been put forth. A. C. Richardson, after considerable work with the musical sands of Lake Michigan, decided that they derived their musical properties from friction caused from the rubbing together of the sand grains which were coated with a thin layer of calcium and magnesium salts coating the surfaces of the grains. He compares the action of the film of dried salts on the sand grains with the action of rosin on the violin bow. (19)

Dr. James Blake examined thin sections of the Hawaiian musical sands and found each grain was perforated with a narrow canal which, as a rule, was closed at one end. Blake believed these perforated grains of sand act as resonators, the air enclosed in them being set in motion or vibration by the friction of the grains. When sand is damp no sound is produced, because the friction is diminished and many of the tubular cavities are filled with water. (20)

Cecil Carus-Wilson, who examined samples of musical sands from the Isle of Eigg, in the Hebrides, decided that the musical notes result from "the rubbing together of millions of clean sand grains, uniform in size." (15) Julien and Bolton regard this theory as insufficient to explain musical sand. They believed the sand grains become separated by elastic cushions of condensed gasses, capable of considerable vibration. The extent of the vibration depends largely upon the purity of the grains or their freedom from fine silt or dust. (10)

Bolton and Julien gathered 320 samples of sand from oceanic beaches, lake shores, river banks, deserts, etc., and found 130 of these possessed musical properties on friction. Of the 130 the great majority were remarkable for a certain degree of uniformity in size — usually about 0.3 to 0.5 mm. in diameter, general round

form, polished surfaces, and freedom from dust and minute feldspar fragments. Consequently they often presented a characteristic oolitic or fish egg appearance, light color, and mobile condition. These characteristics were so marked and prevalent that it would have been difficult, without labels, to distinguish samples from various localities. (9)

Musical sand does not hold its acoustic properties well on being transported. Dampness stills it as well as continued agitation. Bolton found it could be best preserved in glass bottles while others have had better results with paper bags. E. R. Thomas worked with musical sands that had gone mute and found that by sifting to remove fine materials, sorting by rolling the sand down an inclined plane of frosted glass to remove angular quartz grains, and then boiling in dilute hydrochloric acid to clean the surfaces, he could produce sand that was again musical. (4)

Scientists are puzzled as to why a particular area of sand will possess acoustic properties, while surrounding it, and looking identical in every respect under the microscope, lies sand which is completely mute. The answer to this puzzle would, of course, solve the mystery of why "singing sands" sing. The phenomenon presents a most difficult laboratory problem due, mostly, to inability to see within the vibrating mass.

The sands occur in two distinct types of localities: on the shore and on the slip faces of desert dunes and drifts. The whistle or singing of beach sands is produced by a small amount of sand in movement close to the surface. The deep booming of desert sands on the other hand requires the movement of a far larger and deeper sand mass. (5)

R. A. Bagnold heard this booming sand on a still night, deep in the Egyptian desert. The sound rose to a vibrating roar which lasted about five minutes and was so loud that he had to shout to be heard. Upon investigating he found that the sound always came from the lower part of a sand avalanche as it flowed down the slip face of a high dune or drift. The sound only started when the foremost sand of the avalanche had begun to be checked by the change of the slope near the bottom, and the sand above was telescoping into it. (5)

Bagnold experimented with the material at its original site and found that the weight of an overlying layer of sand is necessary to produce the vibration in addition to the force required to cause the actual disturbance of the sand mass. He also found that the disturbance speed that will set a given sand in vibration is determined by some unknown property of the grains themselves—probably some property of their molecular surface structure. (5)

CONCLUSION

The various theories as to the causes of musical sands would lead one to believe that their musical properties are due to several combinations of factors, which vary at different localities. The sands of the Arabian desert, for instance, may derive their musical qualities from a different set of factors than the musical sands of Manchester, Massachusetts. Bagnold took this into consideration but even so, was unable to account for that singular "unknown property" which singing sands possess.

It is certain that until a sample of sand can be examined, and the nature of its acoustic properties determined as well as the conditions under which they will function, we cannot say we understand musical sand. These questions are unanswered as yet.

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MRS. ALLEN OPENS FLORIDA MUSEUM

On Sat., June 4, 1949, Mrs. Rena Allen, of 151 So. Peninsula Drive, Daytona Beach, Fla., opened up her Florida Rocks and Minerals Museum. A former good-sized garage has been converted into the museum which is now attracting considerable atention. The Daytona Beach *News-Journal* in its issue of Thurs., June 9, 1949, carried this item:

"On her next birthday Mrs. Rena Allen will be 70. Like most young people, she readily acquires new and enthusiastic interests, and she has a way of spreading her enthusiasm to others. A year ago she decided to make a collection of Florida rocks and minerals.

"You might not think Florida a very rich field for rocks and minerals, but Mrs. Allen will show you how wrong you are if you drop around. Many of her samples are of rocks which have industrial or agricultural uses, such as kaolin and phosphate, and specimens of these are accompanied by photographs, taken by Mrs. Allen, showing various stages of mining and processing.

"Born in Groton, S. D., Mrs. Allen has lived in Florida since 1890. For 11 years she was librarian at the S. Cornelia Young Memorial Library here, and she made a small collection of stones while she was there, but left it at the Library when she retired. Last year she made a trip to the West Coast and her collection now includes some samples from all but 14 of the states, but it is still essentially a Florida collection.

"Mrs. Allen looks upon her small museum mainly as an educational facility for children. It is open to the public every day. She makes a small charge for admission".

To complete the Museum's collection of rocks and minerals from every state in the Union, specimens are needed from the following states:

Idaho	Massachusetts
Illinois	Mississippi
Indiana	Nebraska
Kentucky	New Hampshire
Louisiana	Rhode Island
Maine	Washington
Maryland	West Virginia

If any reader can donate specimens to fill in the gaps, Mrs. Allen will be deeply grateful for the gifts.

Two Avid Readers!

Editor R&M:

Am enclosing $3.00 for another year's subscription and here is a note to let you know how much we enjoy your excellent little magazine. My wife and I both read it avidly from cover to cover. We both think the recently added section on mineral occurrences is very good.

Congratulations on an excellent job!

C. E. Headington
Havertown, Penn.

Aug. 15, 1949

A DAY AT THE BILBAO MINE, ZACATECAS, MEXICO

By LOUIS W. VANCE
1002 Palm Avenue, South Pasadena, Calif.

Earl Calvert and I were in Durango where we had been collecting Apatite crystals when we decided to travel deep into the state of Zacatecas to investigate the Bilbao Mine. We had been told that some very interesting Wulfenite of a rare pyramidal form had been encountered there. So we left instructions to be called at 6 a.m. We needn't have bothered as the next day was Sunday and at 6 a.m. on the dot the church bells set up an awful clamor. Big bells, little bells and medium sized bells — hundreds of them — ringing madly. We couldn't have overslept on a bet. They kept at it for half an hour, until the whole city was vibrating. After a bit it got on my nerves but at the same time it was quite impressive and beautiful. I think perhaps had we been a little out of town instead of in the shadow of the cathedral it would have been wonderful.

After a quick breakfast we boarded the train and at the end of a day-long trip through rather barren country arrived at Zacatecas about 8 p.m. This is a very old city, capital of the state of the same name, and was founded about 1548, shortly after the conquest, due to the discovery of very rich silver deposits. Mining continues to the present although on a much reduced scale. So far as we were able to find out, no specimens are to be had here.

Our hotel was built around the usual patio, or courtyard, with the clerk's desk in one corner, and the patio served as the lobby. A few easy chairs and potted plants were scattered about the tiled floor. In the center was a large iron plate with some pipes protruding. This proved to be the cover of the hotel well which tapped some of the ancient mine workings below. An electric pump lifted the water to a tank on the roof. As the street drains empty into some of the old workings it is wise to be cautious about drinking the water. We had plenty of halozone tablets and treated all the water we used and had no difficulty.

All the rooms are on the second floor and open onto a balcony which looks down into the lobby and up into the sky. If it ever rains here the lobby must be a mess. Our room was huge, 18x18 feet with a 16-foot ceiling tinted a light blue. It took only a little imagination to see stars twinkling way up there. The floor was green tile. The bath occupied one corner of the room, surrounded by a 6x6 ft. frosted glass partition 6 ft. high open at the top. "Not very private," remarked Earl. However, I determined to try it out. No water. Stepping onto the balcony and shouting to the clerk soon produced a loud clanking from the pump and in about 20 minutes there was water. Very cold water. So I skipped the bath.

After a good night's sleep we braved the chill early morning air of this 8,000 foot elevation to take the first bus to Ojocaliente (means "hot spring" and not "hot eye" as literal translation would indicate.) The hour and a half trip was through an arid treeless plateau country over a well-engineered but badly corduroyed gravel surfaced highway. Ojocaliente, perhaps 5,000 population, is composed almost entirely of one-story unpainted adobe buildings. The plaza is the center of the community with an imposing twin-towered stone church facing one side, municipal buildings on another, and business houses completing the square. The buildings facing the plaza are adobe, plastered on the front, tinted in various shades and neat and clean. The streets are cobblestone, rough but durable. The plaza has nice shade trees, benches and the usual bandstand.

While Earl went to look up the mine office I sat on a bench in the plaza soaking up some of the welcome sunshine and watching several 10-12-year-old boys playing and scuffling. One of these lads was quite friendly and curious and during lulls in the play sat beside me and eventually found out where we were from, our destination and when we expected to be back.

Earl soon returned with the mine superintendent and had hired a man with a car to drive us out. The mine is about 12 miles distance and the not-too-bad dirt road took us through several small agricultural areas and villages of a dozen or so unpainted adobe houses. About the dooryards played small children with dogs, pigs, chickens and a burro or two wandering about. In between the cultivated areas we wound through forests of cactus of the familiar prickly pear variety. Here they grow to be regular trees much higher than the car with trunks 10 inches or more in diameter. The limbs are elongated groups of the broad, flat leaves, thickly studded with needle-sharp thorns. The fruit is used as food in various ways.

Leaving the cactus we climbed a low ridge but little above the surrounding country and reached the mine. The Bilbao is a lead mine and has been worked intermittenly for 10 or 15 years, all in the oxide zone. At the time of our visit it was shut down due to a miners' strike and only a caretaker was present.

We entered by a very steep trail down the side of an open pit to a tunnel on about the 50-foot level. A heavy wire cable had been strung along the trail for a handhold. Horizontal tunnels were followed for several hundred feet and then down a series of ladders to about the 200-foot level. Several stopes and drifts were investigated without finding much of interest. Finally we entered a small stope where we found some nodules of a lead mineral which mystified us at first although the miner called it lead carbonate. We continued working and got quite a few of these. They are more or less round and stained red with iron oxide. Sizes ranged from an inch or less to six or eight inches in diameter, the larger ones looking much like a head of cauliflower. When unstained by iron the surface is a creamy white while the interior is an egg-yolk yellow. They occur in important amounts in the ore, which is a sugary cerussite mixed with much iron oxide. Later on the dump we found some crudely crystallized mimetite which gave us the first clue as to what the nodules were. Yes, they proved to be mimetite, probably the variety campylite.

I found one specimen on the dump containing a 1-inch vug of drusy quartz crystals stained a beautiful emerald green. Perched on the quartz at one end of the vug was a small canary yellow wulfenite crystal and at the other end was an orange colored mimetite crystal. The one crystal was the only wulfenite we found and it now is in my collection.

With our collecting bags full we returned to Ojocaliente about 4 o'clock and sat around the plaza waiting for the bus, due at 6. We sat on the curb and watched the townsfolk as they passed in and out of the various stores. At dusk the local baker passed up and down with a huge flat bottomed circular basket balanced on his head. Every few steps he would cry his wares in a rather plaintive voice. He seemed to be doing a good business. The Mexican bread is very good — superior to the average grocery store bread in the U. S.

Word had spread that two Americans had been out to the Bilbao collecting samples. Before long we were approached by a dignified elderly man dressed in well-worn but clean blue denim (the usual miner's costume). He announced he had two mines to sell, one of copper and one of gold. According to his story the copper ran 30% and the gold 14 grams per carga (300 pounds). Earl told him we were not looking for a mine but were only collecting specimens. His disbelief was apparent but he was too courteous to express it. Most of the miners cannot understand why anyone would collect a specimen unless it had value as an ore. This fellow was not to be discouraged and continued telling how good his properties were. He was a persuasive talker and but for the excitement attending the arrival of the bus we might have been sold a mine.

The bus loaded to the point that a small boy couldn't have gotten on, so we resigned ourselves and returned to the curb to await the next bus, due at 7.

The 7 o'clock bus finally arrived at 9 and also was so crowded that we made no attempt to get on but stood to one side watching the excitement, when our

small boy friend of the morning came to me and excitedly announced that we could get on. It didn't seem possible but I called Earl and got our knapsacks together. Earl talked to the bus conductor who told us that no more could get on. At this point our young friend, who had squirmed by the conductor and was on the bus, burst out in a torrent of Spanish to the effect that the senores could get on. The conductor took a look and agreed. This kid had climbed into the back seat and persuaded one of the passengers to move onto a box in the aisle, then putting his feet against the side and his back against the other occupants of the seat he had cleared enough room for us. With the help of a couple of other boys I got our baggage on top while Earl and the first boy held the seats. Then I squeezed in, passed out coppers to the boys, the door slammed and we were off.

The bus was quite late so as soon as we were out of town we really got wound up to 50-55 m.p.h., paying no attention whatever to the rough road. (This is characteristic of Mexican bus drivers. If a road is passable at all they drive as if it were the best highway everbuilt.) We mostly hit only the very high spots but every now and then we would miss one of the high ones and then hit about three of the low spots in a row — whoom, whoom, whoom. With the rebound from each "whoom" the whole load of passengers rose together toward the top. I began to have a very real fear of cracking my skull and could I have reached our baggage would have donned my miner's hard hat.

There was no aisle anymore, it having been bridged by boards (possibly carried for the purpose.) Each double seat held three passengers and the boards bridging the aisle accomodated three more — one solid mass of humanity. On his ticket-collecting rounds the conductor climbed over the backs of the seats, passengers, etc. There were no lights inside the bus and he made change and examined tickets by the light of a flashlight which he carried in his armpit. No one seemed to mind the inconvenience. We certainly didn't as we thought we might have to spend the night on a park bench. We arrived at Zacatecas at 10:30 p.m., carried our specimens to the hotel and collapsed into bed.

We arose at 4 a.m. to catch the 5 a.m. train, took a taxi to the station on the edge of town, planning to eat breakfast there. Upon arrival we found the station dark and deserted except for two soldiers on guard. They informed us that the train was 5 hours late. I suppose we were the only ones in all Zacatecas who did not know this. The wind was bitterly cold and Earl went poking around and found an unlocked door to the waiting room and turned on the light so we got inside and shivered until dawn. After sunrise we moved out into the sunshine on the lee of the station with the Mexicans who had arrived in droves. Those who can afford it carry a heavy blanket or serape, often beautifully woven. This useful article serves as overcoat, raincoat, extra bedding, etc., and the fortunate possesor throws it around his shoulders, pulls it up snugly and sits down in the sun and has, in effect, a one man tent.

The restaurant opened about 8 o'clock and we had breakfast and sat around chatting with some of the natives until the train arrived, 6½ hours late. It was crowded as usual and we stood for a couple of hours before we got seats and settled down for the long drag. Reached Torreon at 9 p.m., 7 hours late and had time to buy a couple of sandwiches, the first we had to eat since breakfast 12 hours earlier. We then dozed through the night, arriving at Chihuahua at 8 a.m., weary and dirty.

Are mineral collectors crazy? We had traveled nearly 1,000 miles in 5 days by train, bus and auto. And for what? About four hours in a mine collecting a bag full of a rather rare lead mineral called mimetite. Was it worth it? Well, I would do it again. In fact I did. Perhaps I will tell you about it.

Lapidary and Gem Exhibit

Hollywood Lapidary Society wishes to announce their Second Annual Lapidary and Gem Exhibit on October 15th and 16th, 1949, to be held at Plummer Park, 7377 Santa Monica Blvd., Hollywood, California.

A SECOND REPORT ON UNUSUAL LIMONITE FORMS FROM VAN BUREN COUNTY, MICHIGAN

By JEFF HILL
1936 Smallwood Dr., Raleigh, N. C.
In Collaboration with HARVEY FRANZ
1027 Ogden Ave., Benton Harbor, Mich.

Introduction and Abstract

The September-October 1948 *Rocks and Minerals* contained the first study of this occurrence wherein the writers postulated an ancient fulguritic origin (rather than a concretionary origin) of certain limonite forms found in certain areas in the sand dune regions of Van Buren County, Michigan, bordering the southeast shores of Lake Michigan. This second report, without advancing any new indications of this origin, endeavors to support those already proposed with some additional facts and study. The same headings and much the same format are followed, but much textual detail contained in the first report is omitted here for brevity. A summary is included, as of necessity this report must be the last; the present writers are not equipped to proceed further.

Locality and Occurrence

The limonite bearing areas (figure 1) are in appearance and fact quartz sand in which is disseminated a small percentage of iron oxide which renders it a color only slightly browner than the surrounding clean quartz sand. Scattered about the surface of these areas more or less uniformly are the limonite forms in question, eight or ten to a square foot. Scattered more sparsely are brick-size lumps of deep red semi-solid limonitic clay in which there is, however, much quartz sand, but obviously in color and consistency the material from which the limonite shafts were originally formed. These areas are all within the limits of the ancient glacial lakes, and a reconstruction of these areas would reveal that they were once covered by and/or composed entirely of the mentioned red limonitic clay, probably only of shallow depth. Most of the clay has now been washed and blown away or submerged and covered over by quartz sand, but some of it is still seen to outcrop within the areas, especially about the perimeters.

There are no sand fulgurite shafts within at least a one-hundred yard radius of these limonitic areas, a distance much greater than first reported. At one occurrence this radius describes an approximate fifteen-acre area which would normally yield several sand fulgurites.

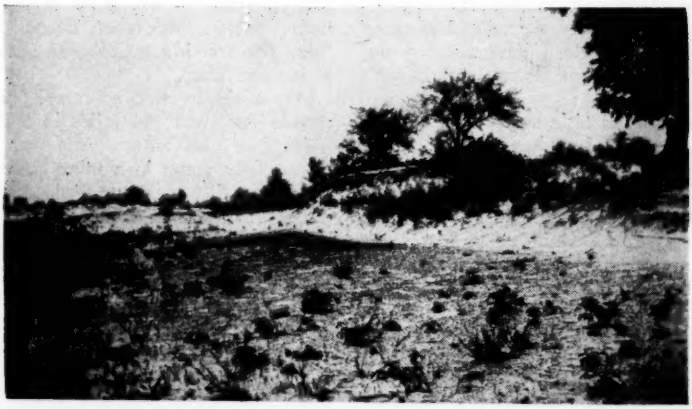


Figure 1—View of typical limonite area, showing the sand floor strewn with fragments (grayed area). Looking north.

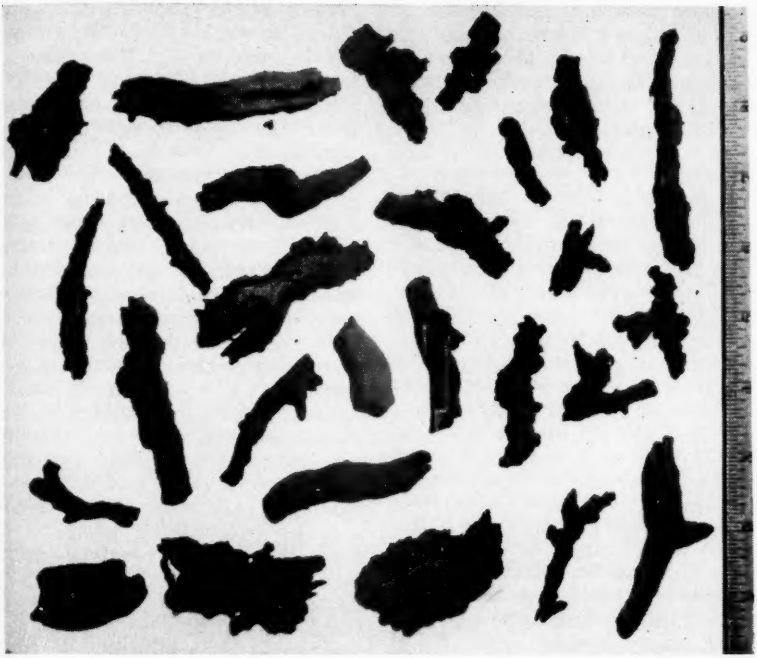


Figure 2—Typical limonite specimens postulated by the writers to be of fulguritic origin.

Description of Specimens

Most of the specimens found, and shown in figure 2, are tube fragments with hollow cores; those which are not hollow show a dark, hard irony submetallic core in cross section, corresponding to the conditions of silica in sand fulgurites. No rounded, elongated pieces were found which do not present these characteristics of true fulgurites. Virtually all tubular specimens show an unexplained longitudinal crease (figure 3).

No part-limonite part-silicate shafts have been found, although an exhaustive search and excavations have been made, and we are forced to rest on the assumption that none exists. However, one remarkable specimen was found and is shown in figure 4. It is a sand fulgurite tube formed and fused fast within the bore of a limonite form, found broken apart revealing the inner shaft, as depicted. Since no "half-and-half" shafts are found, we must deduce that the lightning activity was dissipated entirely within the irony areas — a reasonable



Figure 3—Cross sections of shafts in diagram, showing longitudinal crease and progressive stages of weathering.



Figure 4—Specimen showing fulgurite within the bore of a limonite form. Same Size.

assumption since it is generally thought that iron oxide is a bettor conductor than quartz silica. Also, the many shaft distortions and branchings attest to much lateral dissipation of current within these once shallow areas.

Chemistry

The acid immersion experiment decribed in the first report was repeated with three pounds of tube specimens (those most resembling known fulgurites), but with identical results: no framework or even fragments of heat-fused silica could be seen by the naked eye or a 10x lens after the iron oxide was dissolved out. It was found that concentrated hydrochloric dissolved out much more of the iron oxide and in a shorter time than did the sulphuric. No specks of lignite were found in the sandy residue from the acid as were found in the residue from Van Buren County "bog-iron" masses also immersed in the acid.

Origin

Very little can be added to the discussion under this topic beyond that given in the first report. Briefly, the arguments favoring the two possible origins are as follows:

Concretionary

Concretions are common occurrences; the limonite forms resemble known limonite concretions.* Lime concretions of tubular shapes are even found near these localities. Also, no fused silica or any mineral glasses have been found in the limonite specimens, almost invariable constituents of true fulgurites.

Fulguritic

Several authentic fulgurites resembling the limonite forms and containing only microscopic inclusions of fused silica-glass have been reported. The limonite forms have not been examined microscopically for this. Weak lightning leader currents may have formed these shafts, hot enough to fuse limonite particles, but not sufficiently hot to fuse silica. It is not reasonable to assume that all lightning activity concentrated here consisted only of leader currents; there must surely have been high magnitude strokes also. We are then obliged to reason that the high iron oxide content of the clay provided a better conductor for the current than quartz, thereby lessening heat-creating resistance. But, actually, there would be fewer high magnitude strokes in this irony material since, because of its high conductivity, leader currents would be quickly formed, and the charge would be dissipated through them before a high climactic current peak could be reached.

The remarkable and unexpected absence of any sand fulgurite shafts near these limonite-bearing areas seems definitely to indicate that these irony areas must affect lightning (to retreat in our reasoning a bit) — either to *repel* the lightning strokes with such strength that strokes are even deflected from many surrounding acres of clean quartz sand — or, the limonite sand *attracted* the lightning away from the surrounding areas to strike entirely within its own confines. The latter hypothesis must be the correct one if the limonite forms are to be considered evidences of concentrated electrical activity. It must be remembered that these arguments concern only the ancient period or era when these areas were more solidly limonite clay; there is no evidence, except for the unusual find of figure 1, of lightning striking within these bounds *recently* (that is, since the sand has become predominantly silica), or in the surrounding quartz sand areas — facts which lead one to believe that virtually *all* fulgurites of this entire region are of ancient origin.

It is obvious that the small quartz-sand fulgurite embedded in the limonite shaft (figure 4) was formed at a later time than the limonite shaft, since the ground surface area was of limonitic clay before it became quartz sand. This particular occurrence is an exceptional one and has little bearing on our discussion.

One fact that may in some way account for the absence of (visible) fusion minerals in the limonite forms is the peculiar behavior of iron oxide in quartz sand fused by lightning. Quartz sand colored slightly yellowish by the minute presence of iron oxide becomes gray-colored lechatelierite when fused; the iron oxide is

*See L. L. Smith, "Hollow Ferruginous Concretions in South Carolina", *The Journal of Geology*, Vol. 56 No. 3, May 1949, pp. 218-225.

expelled from the quartz sand and is displaced as bright red powdered sand adhering loosely to the exterior of the lechatelierite shaft. Perhaps the *reverse* process would be true when iron oxide constituted the greater part of the sand fused.

Summary

There yet remain several matters to be cleared before the case can be considered closed: an explanation is needed for the longitudinal crease present in most specimens (figure 3). Such an explanation would undoubtedly give conclusive evidence of the origin of the forms themselves. Second, microscopic examinations would be required to reveal other fusion minerals, if present. Third, laboratory tests would be necessary to prove that limonite in large quantities would attract lightning. Three other plans for projected study which were given in the first report are omitted here as they are concluded and have been given consideration elsewhere in this report.

Because the present writers are not equipped to handle the problems presented above, they base their conclusion that these limonite forms are fulgurites on an incomplete study, but believe the evidence uncovered thus far presents the case as strongly favoring this origin.

ROCKHOUND HEAVEN

By FRENCH MORGAN

We blokes who hunt or polish rocks
Soon learn we're not like other folks;
Although they ride their hobbies hard,
We are the butt of all their jokes.
They talk as if they think we're queer,
And in a class all by our own,
They call us rockhounds, pebble-polishers,
And on occasion, just plain nuts,
While other hobbyists perform
Without the questioning ifs or buts.

Some like discarded household junk,
(Their nominclature is, antiques)
Or hunt old cars, tree stems and roots
With shapes resembling sideshow freaks.
Matchfolders bring to some pure bliss,
Some work with clay, or paint or daub,
Collect rare stamps or safety pins,
Stick bugs on pins or bird nests rob.

While others hoard the lowly button,
Or cups and saucers, new or old,
While most are duped by ballyhooing,
Believing most things they are told.
And thus it goes on down the line,
Of hobbies there can be no end;
Then why not bury bat and biff
And treat the rockhound like a friend?

Some day we'll all depart from earth,
To wing our way to brighter clime;
For should we miss the Gabriel toot
We can't escape old Father Time.
And when we reach that four-square city,
Whose gates are purest, snow-white pearl,
With wall of jasper, streets of gold,
The angel gladly will unfurl
Before our eyes a lovely picture
Of Heaven's gems, without exception,
Surpassing all our fondest hopes,
Or things contained in our collection.

Sapphires, chalcedony and beryl,
Sardonyx, emeralds and sard,
On which to get that velvet polish
We all had toiled and worked so hard.
And now it's ours, as a reward
For things endured while on the earth;
The scoff and scorn that was our lot
Is wiped away in that new birth.

That gibberish lingo now is stilled,
The eye is satisfied with seeing;
No more sore backs or hands or feet,
With angels now we have our being.
And while supremely we're exalted.
There still remains one troubled thought,
The fate that waits our erring brothers
Who followed ways that led to naught.

And while we Rockhounds stand for justice,
For love and kindness, all the while,
The Lord may grant us one indulgence,
Permitting one last fleeting smile —
For, as we make the welkins ring,
Echoing Hallelujahs swell,
We know but one alternative
For those beset by tolling knell —
They must all good Rockhounds become,
Else stoke the raging fires of — Well?

A TRIP TO CRYSTAL RIVER, FLORIDA

By MRS. RENA ALLEN
151 S. Peninsula Drive, Daytona Beach, Florida

This trip to Crystal River on the West Coast of Florida all came after I had written a letter to the State Geologist, Mr. Herman Gunter, at Tallahassee, Florida, asking him if there were any gem stones in Florida. He replied, "Florida is not blessed with many gem stones, although she does have some minerals. In the Tampa Bay region there is a material that has been polished and made into semi-precious stones, but it appears not to be in commercial quantities." He also inclosed a list of publications. "You will find 'Collecting Semi-precious Stones in Florida' published in *Rocks and Minerals*, Dec. 1941, but I am sorry that we do not have a copy to mail to you direct."

I already had subscribed for *Rocks and Minerals* and had received a copy of the December, 1941, issue which gave the story of the Tampa Bay region. I did not need that. Also, I had visited that region and collected an auto load of the various Coral formations, including a three pound rock of Black Onyx. Mr. Gunter also sent two leaflets, which gave the names of the minerals, either mined or quarried in the state. These were: Phosphate, Land pebble, limestone, railroad ballast, Agricultural Lime, Kaolin, Fuller's Earth, Ilmenite and Rutile. Under each one of these was a list of the names of the Producers reporting production for the year, 1945. In reading the pages several times I almost became acquainted with the various producers, so I wrote to several of them. The most appealing answer I received at this time was from Mr. C. H. Moore of the Crystal River Rock Company office in Leesburg, Florida, saying in part, "You are welcome to visit our quarry at any time and I am sure you would find such a visit worth your while. Ours is the only quarry in the state with an exposed vertical depth of over 100 feet, and in addition to the interesting fossil shell formation, you will find many pure Calcite crystals. Our quarries are quite large, having been in operation since the 1890's." The crystals settled the question of where I would go from here.

On November 20, I phoned my daughter, Pat Belisario, who was teaching in San Antonio, Florida, and asked if she could have a Thanksgiving vacation and take me to hunt crystals at Crystal River. She replied that she could come to Leesburg with her car if I would meet her there Wednesday eve. We would visit Crystal River Thursday and Friday. On Tuesday evening I arrived at Leesburg and found a room at Needham Hall on Main Street. Wednesday morning I visited the office of the Crystal River Rock Company. I had heard that there were places around Leesburg of rock formations that had been used for building and therefore I wanted this extra day to look things over. Mr. Moore said there was a house several blocks up the street that had a veneer of local stone quarried around Leesburg. On reaching the house, which was not occupied at the time, I examined the rocks. They were rather rough, but very colorful and the appearance was pleasing. There was a rock wall next door built of the same material.

As I crossed the railroad track returning I noticed some pieces of white rock on the track, so I investigated it, and found also some pieces of grey stone. My! I thought that grey looked very hard. It might cut a gem, so I picked up several pieces in fact all of the grey. I had forgotten to take a paper sack along as I usually do when out hunting stones, and as I passed the Express office asked for a piece of newspaper in which to wrap up the stones, and they gave it gladly. Everyone is so kind in Leesburg. Later on returning to the office I showed my finds to Mr. Moore who said that in this locality they called the grey rock, Flint, and the white, Hard Lime Rock.

Then I asked him to please give me the directions to their Quarry, which he did. We would drive about 60 miles

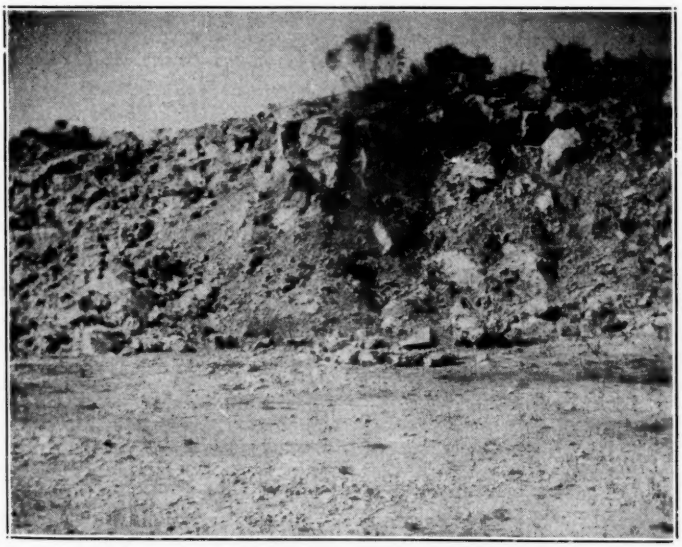
west on Highway 44, to within 5 miles of the town of Crystal River. On the right side of the road we would see a house with a large expanse of lawn, and just past it on the left was the road to the Crystal Quarry, a distance of two miles. Mr. Daniels lives in this house and we were to stop there and ask his permission to visit the quarry. He is the superintendent.

Daughter arrived Wednesday evening as per plans and Thursday we left in the forenoon for our destination. Upon arriving at Mr. Daniels home, we decided to pass on and let him enjoy his Thanksgiving dinner and we would find ours somewhere. We passed the Crystal River Inn, then a Cafe, on past the drug store, post office, hardware store and a drygoods store, and several nice houses with large lovely green lawns. This place is on an inland waterway out of the Gulf of Mexico where there are all kinds of good fishing for boat parties. There is also a Motel on Highway 19 which passes thru from the North and leads South to St. Petersburg. We ate our Thanksgiving dinner at the Cafe, enjoying Crystal River Frogs Legs, with all the trimmings.

On returning to the Daniels Home, we found him busy with his water pumps, which had been giving trouble. He kindly gave us our freedom of the quarry and said "The boys are just getting ready to go to work, so you follow them and they will open the gate for you".

At last we reached the quarry. What would we find? — would there be real crystals? And how would we find them? We were both so excited. We parked at the top of the hill. The road didn't look too inviting and we did not want to get into trouble. So we started to walk down a long incline. On one side Pat paused to investigate the high bank. All of a sudden she raised her hands up high and called, "Mother! I've found one, a big one. Oh! it's a beauty." She ran back to show it to me. Sure enough it was a gleaming Calcite crystal, the first Florida specimen I had seen. Now we were excited and both looked along that bank but no more did we find there.

Farther down the road we both paused



The limestone quarry at Crystal River, Florida.

to look at everything in sight. On the east side of the quarry facing us was the long high wall, it looked to be endless in either direction. But we were not on the bottom of the "canyon" yet. One place on the left, looked like a path down a steep incline. Pat started down catching on to the few straggling weeds along, and called out, "Watch your step, Mother — for here they are, all kinds and sizes, but in huge chunks. How queer! All sides of these rocks are a-glitter.".

I was so excited I slipped and sat down right beside a large boulder. Then I looked at it. Oh! I never hoped to see anything so beautiful, tiny crystals all over and there was a large cavity inside of which were larger crystals; some hanging down and on the lower side were pointing up. Looked like the mouth of a snarling wild animal. It gave me the shivers, it was so beautiful.

Well I must be on my way, so down I went, rocks on both sides of the not too good path. I began picking up each crystal to get a good look, then laying it aside as one I would like to take home.

Farther down I found a place where there were several beauties in a pile. Pat called, "That's my pile, hands off!"

On the floor of the "canyon" we stopped and looked — still no end — just large bluffs that seemed endless. All along that side. This near side was like low rambling hills up to the road but all covered with huge rocks. A climb there didn't look too inviting. We passed on over the floor of the "canyon" to the opposite bluff side. Here we could see large boulders sticking out of the sides or lying at the foot in large piles. On looking closer we found every one had some beauty to it. There were sides all covered with a rough crust of buff colored crystal formation. Pat found one of solid crystal. Later we found it weighed 30 pounds. She of course promptly carried this to the car so it wouldn't get lost in the shuffle.

We heard a noise and on glancing up we saw an old man and three boys coming down. We wondered if they were going to object to our taking so many specimens. No — they came to visit and the children pulled their shoes off, the better to play tag over the rocks, hopping from one stone to another. The old man said he'd been around these parts quite some years. "Yes, we just shoved all these crystals aside as useless for we were digging out the lime rock which was marketable". The boys found a pool on the low side and went paddling. That was the only place we saw any water.

Night was coming, the shadows came creeping in around and we thought it better to be out of there. So we started to carry our picked-out rocks up that hill. Some climb but at last we made it and with a sigh of satisfaction we got in the car and started off. Seeing some workers at a large building near the quarry we stopped to ask, "Could we come again in the morning?" "They said, "Sure, come along. Next time you might stop off at the first road inside the gate. You may find better crystals down there."

We left with the thought of what tomorrow might bring. But where would we stop for the night, "Let's try the Crystal River Inn", I suggested, "It looked inviting." So we did and found a very good place to stop.

In the morning with a good breakfast provided we were on our way once more to be dazzled by the beauty of real Florida crystals. The men let us thru the gate, and we proceeded as before, leaving our car at the top and walking down the long slanting path. At the foot of the path we found the floor was hard and slightly sandy in places. No grass or weeds here, the cattle had surely kept this place clean.

We settled down on a large pile of rocks and just feasted our eyes on this wonderous sight. Here the morning sun seemed to linger and delight in showing us the wonders God did. Some rocks were covered in spots with drusy quartz. Could anything be more beautiful? We started sorting them over as before, finding different kinds here as the men yesterday said we would. Hearing Pat exclaim, "Mother, just look on that bluff" There was a spot on a very large rock that seemed to be all afire. She said, "I must go up and get it. Hand me that chisel and rock hammer." So up she went,

picking a place for a foothold from rock to rock — in and out she picked her path. Soon she reached the place and I heard the hammer strike, one, two, three times. But to no avail would that spot be dislodged. All of a sudden I heard her call out, "I'm getting dizzy and sick. It's hot up here. I'm coming down." And she did, slipping to the ground and there she lay for quite some time. "I forgot my head does not like to climb ladders or go up high places. The rocks were just too beautiful. Made me forget," she murmured softly.

It was then I began picking out those pieces, choice pieces. I must have collected at least one rock of every kind of formation and then started lugging them to the car, a few were quite heavy. How I wished for a lot of newspapers to wrap each lovely piece, so as not to bruise the crystals. We did have boxes in the car and that helped to separate them. It was here I thought of my camera. Why — I hadn't taken any pictures. So I dug out the camera, turned, and took one picture down that long road. I'd not forget that climb right away. Then down in the "canyon" to take Pat's hill, for another picture.

At last we were ready to leave. Looking back I could visualize a crystal palace built in that "canyon" — with a real wall of crystal all around.

Pat decided she would have to drive me back home with this load. At the start we had planned to pack the boxes and ship them home. But we had, found a whole carload! So we returned loaded down, tired out, — but happy. A grand ending to an outing at Crystal River, Florida.

Editors Note; The name Crystal River does not allude to the crystals in the quarry, as some might assume, but is the translation of two Creek Indian words for *clear water* (crystal water or crystal river). The name is over 100 years old and at that time and perhaps it still is, the water of the river was *crystal clear*. From the river the little town on its bank got its name.

Queen of Fluorescent Minerals

In my collection I have a great variety of the fluorescing minerals from different parts of the country, including many fine specimens from Franklin, N. J., such as large pieces of solid Willemite; also the calcite and Willemite and other mixtures. Also solid Wernerite from Canada. None can compare in sheer beauty, however, with Dolomite specimens from the Mirabel mine on Mount St. Helena, near Middletown. Calif.

So far as I have been able to ascertain, I was the first mineral collector to discover that much of the Dolomite, particularly crystallized material, from this quicksilver mine fluoresced in a variety of brilliant colors, and in shades of blue, purple, red, green and golden, some with a lovely rainbow effect where the Dolomite was banded. Best results were given with rays from the Purple-X bulb. The colors are quite different under the Mineralite.

This was in the early days of World War II, when I was able to obtain some of the choice pieces from the rock pile before other rockhounds followed in my footsteps after my prompt report to the Northern Californian Mineral Society.

One 30-lb. piece which I presented to J. L. Kraft, the well-known jade collector of Chicago, was a blaze of golden glory. It was so brilliant when uncovered that it dimmed golden Wernerite when the same was placed alongside. I wonder if Mr. Kraft made a pair of bookends out of the specimen? At the time he told me it was too lovely to cut. I have yet to see anything compared with my own fluorescing bookends.

Sometimes I feel quite unhappy, and fluoresce blue, because I have not been able to return to the Mirabel location. The mine is just off the paved highway, so is one of easiest of rock hunting grounds for Northern Californians to reach.—T. O. L.

TRIP TO MEXICO — (Part 3)

By PETER ZODAC
Editor, Rocks and Minerals

11th DAY
(Wed. April 21, 1948)

Today we are to enter Mexico! It will be my first visit to a non-English speaking country and I know only one Spanish word — *gracias* (thanks). When I left Peekskill 10 days ago to attend the big mineral show at Austin, Texas, my plans were to return home after the event was over and so I was unprepared to go further on and especially into Mexico. No notes, no maps, no check up on the Spanish language, etc. I was also a little uneasy over what I had heard at the mineral show when some of the collectors heard that my companion, Don Gabriel, of Detroit, Mich., was going to Mexico. "Go on down with him," they kept urging me, "it is a wonderful country with beautiful scenery and hospitable people. You will enjoy yourself greatly and will never regret the trip. Don't miss the chance to go but—be careful of what you eat and drink. Don't touch the water, drink beer instead." I detest beer and if water was out of the question, what was there left to drink? "Drink plain tea—leave milk alone, too," was the parting advice.

We had spent the night at the Cortez Courts on the northern outskirts of Laredo, Texas, the gateway to Mexico. Cortez Courts is a very nice place—it has large clean cabins with showers and a good restaurant. Laredo has a population of about 40,000

We got up about 7:00 a.m. and no sooner did I step out of the cabin when I noticed a good size orange tree in front of me and loaded down with large yellow oranges. It was my first sight of an orange tree and being fond of the fruit I quickly grabbed an orange and began peeling it. To my amazement and deep disgust, the orange was so bitter that I had to throw it away. Perhaps the oranges were more for decorative purposes than for eating. My feelings were soon soothed, however, by the finding of a nice deep brown jasper in the terrain surrounding the cabins.

Don had in his car some camping equipment and other material which would not be needed in Mexico and so he stored this away in a building adjoining the restaurant. This was a good idea because the less material we had in the car the easier it would be to pass through customs inspection. We also packed up all minerals collected on the trip to ship home before leaving the country.

We left Cortez Courts at 10:15 a.m., heading for the city where we shipped our minerals home via Railway express, made a few purchases, and attended to other business. One of my purchases was a large Mexican sombrero which cost me the large sum of 15c. It was a good hat, too, and I can't see how it sold for such a low price but I got stuck, nevertheless. I wore the hat for a distance of only 15 feet (from the store to the car) and taking it off it was laid on the back seat and never worn again as it was not needed in Mexico.

Our purchases completed, we headed for the AAA office in Hamilton Hotel, Laredo, where we obtained preliminary papers for entering Mexico. We also converted here some American money into Mexican, I believe we got $4.90 for every American $1.00; so for $20 I got $98.00 in Mexican money.

Leaving the AAA office, we headed for the International Bridge, 3 or 4 blocks away.

It was exactly 12:00 noon when we started to cross the International Bridge over the Rio Grande into Mexico (toll 15c). The river here is only about 200 feet wide. An American officer stopped us at the bridge, asked us a few questions, and then told us to go on. In the middle of the bridge a Mexican officer stopped us to inquire (in good English) where we were going, how long we were to stay, etc. On being told that we were going to Mexico City and would spend a few days in the country, he instructed us to go straight ahead for 16 miles when we would come to a customs inspection depot where our bags would be examined,

a permit for the car obtained and also tourist cards. With a friendly wave of his hand, he sent us on.

Nuevo Laredo, a Mexican city of about 28,000 population, is on the other end of the bridge. To all appearance it seemed to be a continuation of the Mexican section of Laredo. We drove through the heart of the little city but once the outskirts were reached the desert began. The change was so abrupt that it was very noticeable. For 16 miles we travelled in a straight line through a flat desert country. Cactus and more cactus and many other desert plants and shrubs were growing in all profusion on both sides of the road and as far as the eye could reach. No birds, animals, or any insect were to be seen — not even a car or a human being — we seemed to have the desert all to ourselves. As the terrain was so very flat, no rocks were expected to outcrop and none were seen, but now and then a tiny brook would either parallel or cross the road and we stopped a few times to examine the pebbles in it.

From Nuevo Laredo (elevation about 400 feet) the road went in a straight line through the desert for exactly 50 miles until Rio Salado is reached at La Gloria (sign post here only but a road for Nueva Rosita leads off to the right).

A few miles back from this point the road begins to rise so that at La Gloria its elevation is about 500 feet, at Sabinas Hidalgo it is 970 feet, and then from thence on it is always chiefly in the mountains to Mexico City.

Our journey began in Detroit, Mich., on Mon. April 12, where we set the speedometer at 0.00 and we continued the mileage into Mexico. Nuevo Laredo (on the Pan-American Highway) — the main highway of the country) is 788 miles (1226 kilometers) north of Mexico City.

1871.0. Mileage at the beginning of the International Bridge in Laredo, Texas.

1881.0. Our first stop in Mexico where in the terrain bordering the road we collected a number of quartz pebbles among them being basanite (black) and jasper (brown).

1888.0. Customs inspection depot. We were proceeding at a nice rate when suddenly a small rough building (more like a shed) was seen bordering the right of the road. It appeared to be deserted when suddenly some men jumped out and signaled us to stop. Wonderingly we did so and soon learned it was the customs inspection depot. Here we had to drag out all our bags and place them, opened, on the rough table alongside the car. The inspection lasted only a few minutes due to the fact that there were 4 inspectors (including an old lady) and our car was the only one there. The only job that the old lady had, as far as we could see, was to make an "X", in white crayon, on all our bags (this mark still shows today — over a year later — on one of my bags even though it has seen lots of travel). The inspection over, we entered the building where a young officer proceeded to make out tourist cards for us (fee $2.10 American money); Don also received a permit for his car. The officer gave us each a printed form on which we were to enter all items purchased in Mexico that we would take back with us into the United States. As we pulled away from the depot, we noticed that a Tourist sticker had been affixed to the windshield of the car (this sticker was of great help to us later).

We were still in the desert, after the depot had been left behind, and again no signs of life were seen for miles. The Customs inspection depot was truly a lonely outpost in a huge desert.

1917.0. Rio Salada (a small stream) crossed.

1936.0. Vallecillo. This is an old but small mining town and the first settlement reached since leaving Nuevo Laredo. The sign post here read 1121 K (from Mexico City). In Mexico distances are measured in kilometers (one kilometer equals 3,280.8 feet). The Pan-American Highway is a well paved road and sign posts are set at every kilometer.

In Vallecillo we saw to the right a good sized mine dump, shaft, etc., but the mine seemed to be abandoned. We passed it so quickly that before I realized it we were out of the town (which seemed deserted,

too). As we would be coming back this way, we kept on going with the intention of stopping on our return.

Between Kilometers 1118 and 1117, a good view of the Valley of Sabinas Hidalgo and the Sabinas Mountains may be had. It was a relief to see the mountains.

1951.0 (1097 K.). Sabinas Hidalgo. This little city (12,000 pop.) is a thriving ranching and farming town. Here, alongside the highway, is located Power's Cafe, a famous American eating place and curio store. Of course we stopped for lunch after which we inspected the many items on exhibit, among which were some minerals. No labels were shown with the minerals, and not one of the clerks knew anything about them or their localities. The minerals did not interest us, and so none were purchased. I did purchase, however, "Power's Guide to Mexico" (price 50c) which was a gold mine for information.

In the terrain around the cafe, I noticed a number of dark gray (almost black) limestone pebbles.

After leaving Sabinas Hidalgo, which lies at the foot of the mountains (the desert being left behind some few miles), the road begins an easy climb up the mountain until Mamulique Pass is reached. The scenery from the Pass (elev. almost 2,000 feet) is very beautiful and the winding road reminded me of the famous Storm King Highway near Peekskill, N. Y.

1973.0. Limestone begins to outcrop along the right side of the road. It is dark gray in color, horizontally bedded, thinly banded, and extends for miles averaging 25 feet in height. Apparently all the mountains in this area must be of limestone.

1976.0. Customs Inspection a g a i n (2nd depot) at 1064 K. The inspection here was of the briefest — the showing of our car permit.

2000.0. Campo Aviacion (airport) — American Air Lines of Mexico — to right of road.

2008.0. Northern outskirts of Monterrey — stopped to get gas here.

Long before reaching Monterrey, splendid views of the mountains are to be had (both sides of the road). To the right is the Sierra Madre Oriental range, which rises in tooth-like peaks; to the left a very good view of the curious Cerro de la Silla (Saddle Mountain).

2012.0. Large Canada Dry plant (a beautiful building to left of road) in Monterrey — army fort across street.

Monterrey (King of the Mountains) is a beautiful city and the Capitol of Nuevo Leon. Pop. 180,000. It is not only the largest manufacturing city in Mexico but is the country's most important touring center; its altitude of 1,758 feet above sea level and its location in the mountains makes for a healthful climate enjoyed all the year. It is the 3rd largest city in Mexico. (Mexico City, pop. 1,465,000, is Ist; Guadalajara, pop. 228,000, is 2nd; Monterrey, pop 180,000, is 3rd; and Puebla, pop. 137,000 is 4th).

We made the wrong turn in the heart of the city, going west, towards Saltillo for a few miles before we realized our error; we should have turned left instead of right. So we had to turn around and go the other way.

2023.0. The famous Saddle Mt. is only about 500 feet to the left at this point. We had a very good view of it. Its rock appears to be gray limestone.

2041.0. Villa Santiago, a small town. Sign here for Horse Tail Falls, to right. We did not stop as the falls were a few miles to the right. Perhaps we should have visited the locality as the falls are said to be very beautiful.

2110.0. (862 K) Linares (pop. 10,000). A nice little town which we reached at 6:00 p.m. and where we planned to stay for the night. Here we registered at the Canada Courts, operated by Mr. and Mrs. C. Hardwicke. The Hardwickes are from Canada and the cabins have Canadian names; we had Prince Edward Island cabin. The cabins are very nice, clean and comfortable. American meals are also served in their large dining room.

I might mention here that at the beginning of our trip, Don introduced me to two very good guide books by Duncan Hines — *Adventures in Good Eating* and *Lodgings for the Night*. These

books list by states and some foreign countries (including Mexico) recommended eating and lodging places. This is how we knew of Canada Courts and other good places. It was most helpful and a great relief to know that in such and such a place along our way would be found a nice clean tourist court or hotel where good American food would be served and English spoken. I heartily recommend these books to all tourists.

Linares is a farming and ranching center of eastern Nuevo Leon state. At the Canada Courts I noticed that the driveways were paved with gray limestone pebbles while small mounds of pebbles were scattered here and there. These pebbles came from the river bed (a small stream several hundred feet away) which divides the city of Linares. I collected from the mounds several nice specimens of limestone pebbles showing thin white calcite veins; also a nice black basanite (quartz) pebble.

Mileage for the day—243.

12th DAY
(Thurs. April 22, 1948)

I awoke at 6:30 a.m., greatly refreshed from my first night's sleep on foreign soil. We were too early for breakfast so we hit the trail again, about 7:30.

2110.0. Canada Courts, Linares.

2111.0. Rio Pablo, the small river which divides Linares.

2147.0. Tomasenco, a small town in western Tamaulipas state.

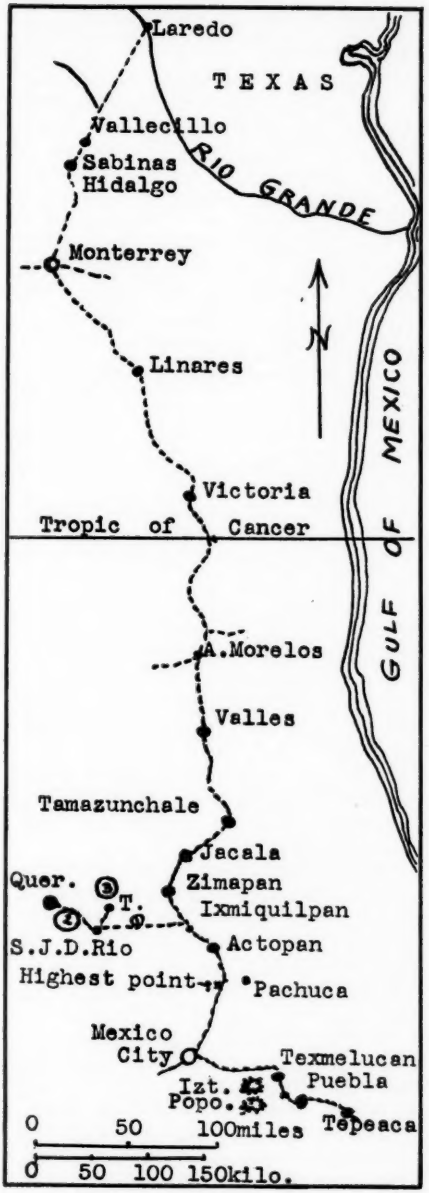
2152.0. Limestone breccia outcrops to right of road. The rock is grayish and black and specimens collected fluoresce brown under the Mineralight.

2164.0. Railroad crossing (single track). This is the first railroad that we saw in Mexico.

2171.0. Rio Purificacion crossed. The river is about 200 feet wide but shallow and full of limestone (?) pebbles. We did not stop.

2195.0. (706 K). Ciudad Victoria (pop. 20,000). A nice little city and capitol of Tamaulipas. Here we ate breakfast at Sierra Gorda Hotel (recommended by Hines).

2219.5. Tropic of Cancer crossed at 9:15 a.m. (between 669-670 K). A little wooden sign is here. Latitude of



Dotted line shows route taken through Mexico by the two collectors. Nos. 1, 2 and 3 show locations of the basalt, obsidian, and opal localities.

the sign is N 23° 27' 15".

2226.0. Sombrero Mountain off to the left. It looks like a huge sombrero, hence its name. Elevation 4,000 feet.

2278.0. (571 K). El Mante or Villa Juarez, center of a huge sugar plantation.

2291.0. We go through a mountain pass. Gray limestone outcrops here but we did not stop — road too narrow and no parking space.

2292.0. Small limestone quarry to left (close to road), between 550-551 K. It was working but we did not stop. We did not realize its presence until we had passed it. We would not have stopped even if we had seen it in time, due to its being worked and we did not know Spanish.

2297.0. (542 K). Antiquo Morelos, a small town. Road to right for San Luis Potosi and Guadalajara.

2307.0. San Luis Potosi line crossed.

2311.0. Limestone outcrops here.

2338.0 (473K). Valles a small hotel town. We got gas here.

2351.0. Rio Tampaon, a small river, crossed.

2354.0. Limestone quarry 100 feet to left (blue limestone). We did not stop.

2367.0. Fruit Inspection Depot. Don had to drive the car through a trough filled with dark brownish liquid; then we both had to get out and walk through a trough containing some material (leaves perhaps) heavily soaked with the same dark brownish liquid.

2371.0. Limestone pebbles seen here.

We soon were traversing a banana growing area, the fruit being cultivated on the sides of steep mountains. As far up as you could see — for hundreds and hundreds of feet, apparently to the very top of the mountains — bananas were being cultivated. Some of the sides are so steep that in order to reach the bananas, men have to be let down by ropes, we were told later. High mountains were all around us. Around here, too, we saw many Coca Cola and Pepsi Cola signs while large Orange Crush trucks were a most welcome sight. From now on, soda signs and soda trucks were very common and soda was my main drink while in the country.—You ordered soda by its English name.

2400.0. Road winds up and down mountainside. Good views.

2401.5. Parking lot — the 1st one we saw in Mexico. Wonderful views. Dark gray limestone outcrops here.

2404.0 (367 K). Tamazunchale (Pronounced Thomas and Charlie). A beautiful tropical town (el. 400 ft.) at the base of the great mountain chain. It is an Indian town, most of the natives being Aztecs. We had a good dinner here at the Pemex Rest.

Moctezuma River flows through the town which we followed for many miles. In Tamazunchale we started to climb into the magnificent Sierra Madre Mountains with stupendous scenery on all sides (Moctezuma River way below), later dropping down into the beautiful valley which cradles the picturesque town of Jacalpa.

2415.0. For the past 3 or 4 miles, natives (mostly youngsters) were passed along the road who on seeing us, would hold up their hands at the same time yelling something in Spanish (or was it Indian?), but we did not stop to investigate. After we had passed the last group, it dawned on us that the material held in their hands looked like minerals, perhaps crystals. At mileage 2415, a boy appeared in the road (from nowhere it seemed) and he, too, held up his hand, yelling at the same time. This time we stopped. Sure enough he had crystals, rock crystals to be exact.

"Cuanto?" (How much?), I asked. I learned the word from Don.

"Uno peso" (One peso).

I bought his entire supply of 12 for one peso (about 20c). He was the last native seen offering crystals for sale.

They were fairly nice crystals, some doubly terminated but full of cavities. Apparently the crystals are found somewhere in the neighborhood. Later I inquired in Mexico City and elsewhere about the crystals but no one seemed to know anything about them.

Dark gray limestone outcrops here (where we bought the crystals) along the left edge of the road and extends for many hundreds of feet in both direc-

tions, in fact we noted it for miles, outcropping here and there.

2419.0. Hidalgo state line crossed.

2421.0. Parking area; stopped to examine magnificent scenery to right.

From the limestone outcrop to the left (parking area) I collected some nice brownish banded calcite onyx; also tiny gray calcite crystals (bruised and stained brown) in dark gray limestone; and some brownish, coarse crystalline calcite masses. These specimens were later found to phosphoresce under the Mineralight.

2423.0 (339 K). Chapulhuacan ("Grasshopper Hill"), small town on side of the mountain.

2433.0. (321 K). Santa Ana, a small town.

2439.0. Tunnel in limestone cliff, edge road, left, but we did not stop to investigate as there was no room to park.

2442.0. Fine view to right. Limestone outcrop to left. Collected from the limestone, small white calcite crystals in cavity of white crystalline calcite.

2461.0. A peculiar white rock outcropping for a mile or more and looking like decomposed limestone, borders the road but it was not convenient to stop to examine it.

2462.0. (272 K). Jacala. Stopped for gas.

The peculiar grayish rock outcrops across the road from the gas station and I went over to examine it. It was decomposed limestone which outcrops for miles around the city.

Jacala is a pretty little town and lies in a beautiful valley. We had a splendid view of the town from the highway 1,100 feet above, as we approached Jacala whose elevation is about 4,400 feet.

2463.0. Large quarry in the decomposed limestone at edge of town. It is to right of road and we did not stop as it was working.

2465.0. Another and smaller quarry to right of road, in the decomposed limestone, and we did not stop.

2478.0. Durango, a small town.

2504.0 (206 K). Zimapan, reached 6:00 p.m., where we are to spend the night as it was not advisable to go further as the next stop would be too far away. We registered at Hotel Fundacion, a very nice place, which has a patio, large wine cellar, private chapel, swimming pool, restaurant, etc. We had room 22.

Zimapan is an interesting little town whose elevation is close to 7,000 feet.

The road from Tamazunchale to Zimapan is most treacherous at night as clouds, fogs, and rain are common so that driving is often very hazardous. On our trip we had no clouds or fogs to contend with but heavy rain, even though it did not last long, came at frequent intervals which at times was most annoying.

Though many rock outcrops were seen today some of the most interesting ones could not be examined because there was no room to park along the narrow mountain road. Some of the working quarries looked interesting, too, and we would have stopped, if we knew the Spanish language so that we could talk to the men.

Mileage for the day—394

13th DAY
(Fri. April 23, 1948)

2504.0. Hotel Fundacion, 7:00 a.m.

High up in the mountains from Zimapan, masses of boulders were seen in road cuts — the boulders were in horizontal layers. In many places, too, clay (?) beds were seen which were so steep and smooth that the vertical road cuts had the appearance of being plastered — some of the cuts were 50 feet high.

2526.0. Organ pipe cactus is common around here. This type of cactus has huge stems that must be 8 feet high and about 6 inches wide. In this area we saw many of these stems being used for fences, as sidings for small houses, etc.

2528.0 (167 K). Road to Queretaro, to right.

2533.0 (159 K). Ixmiquilpan, a small town. Got gas here. We turned around as we wanted to go to Queretaro.

2538.0 (167 K). Turn left on Queretaro road.

2543.0. In center of a vast treeless flat area. One nice ranch in it.

2565.0. Huichapan, a small town.

2572.0. Junction with Napala Road. Black basalt here covers many acres of level ground. The basalt is in large loose

blocks. Here we found small cream-colored globular masses of aragonite in vesicular basalt. Small globular, colorless glassy masses of hyalite opal in cavities of the vesicular basalt.

A few hundred feet further on a dam was under construction; lots of basalt outcrops here but we did not stop, due to men working. Past the dam and for miles, nice grazing country — the finest we saw in Mexico.

2582.0. Queretaro state line.

2595.0. San Juan Del Rio (St. John of the River). A small town of about 7,000 pop. Here we did something unusual. We parked our car and hired a taxi to take us to Tequisquiapan, a small town of about 3,000 pop. where we were to visit an opal dealer. It was a few miles north of S. J. Del Rio. The taxi wound in and out of S. J. Del Rio through a number of lanes which were so narrow that it was a wonder we made the turns — suddenly a lane widened and we were on a broad highway. Our trip to Tequisquiapan was in vain as the dealer was away but we left word that we would be back tomorrow. We therefore retraced our way back to Del Rio, discharged the taxi, got in our car and headed again for Queretaro.

2615.0. El Colorado, a very small town, apparently, as we saw only a couple of houses.

2617.0. Obsidian locality. We were now traversing a flat, barren mesquite covered area and noticing many basalt boulders we stopped to examine some of the masses. The basalt was vesicular and the only mineral associated with it was hyalite opal which occurred as colorless, globular, glassy incrustations. The basalt was found to the right of the road.

To the left of the road, obsidian was found but only as small, black, lustrous, glassy masses. It was very common, lying loosely all over the surface of the ground. About 500 feet to the left of the road was a large mesa-like hill, about 30 feet high and 100 or more feet in diameter— it was very conspicuous on the flat landscape as no other hill was present. In this hill obsidian was seen imbedded in a manner somewhat like consolidated gravel. Some of the obsidian collected had been worked by ancient Indians as broken arrowheads were common (not noticed in the field but noted on arrival home when the material was examined with more care).

Another mineral that was common at the obsidian locality was chalcedony which occurred as small whitish masses and fragments lying on the ground—some of it showed botryoidal surfaces.

2625.0. Queretaro. Pop. 40,000. Altitude 6,200 feet. Capitol of the state of the same name. On the outskirts of the city, as you enter it, is an old aqueduct, built in 1739. The aqueduct is 5 miles long and the road goes under it.

Queretaro is famous for the opal mines in its vicinity and this is why we were there. We arrived around noon and registered at Hotel Gran, a Mexican hotel, as no American tourist court was here. We had room 29, which looked out on the plaza. The room was comfortable even though large and with a high ceiling. One feature we did not like, however, was that after you locked the door, with a good sized key, you hung that key on a numbered hook (with other keys), just a few feet away. All these keys are in plain sight. When you want to enter your room, you grab your key, and on going out you put it back on its hook.

Unfortunately for us, only one individual in the hotel could speak English and he was the clerk who registered us. We had dinner here but it was one of the worst we had in Mexico due to the fact that the menu was in Spanish and we could not read it — we pointed out a few things to the waiter trusting to luck he might bring us something we could eat. The English-speaking clerk was not behind the desk so we could not call on him for assistance. Later, when we were finished, we beckoned to the waiter and motioned for our bill. To our amazement, instead of presenting the bill, the waiter let out a string of Spanish at the same time going through some gymnastics with his hands. Not understanding any of his talk or motions, we put some

money on the table which he finally took with some reluctance, bringing us change a few minutes later. Completely mystified by his actions, we left the dining room hoping to spot the clerk to learn what it was all about but again he was not around, as a matter of fact we never saw him again. Later, however, we learned that payment for a room also included meals. The poor waiter, therefore, had been trying to tell us this.

Don is keenly interested in opals and for this reason was his trip made to Mexico — to visit Queretaro and some of its opal mines. He had obtained the name of Eddie Hernandez, an opal dealer and cutter in Queretaro, and on registering at Hotel Gran had asked the clerk to contact him, which he did. Eddie called for us in the afternoon and to our joy he could speak good English, he having spent a few years in the States. Eddie took us to his establishment where we saw much amethyst being cut and facetted but practically no opal. According to Eddie the opal mines have been shut down for some time and the few that he does get and polishes he ships to his father who is a gem dealer in Taxco, Mexico. Apparently there has been but little demand for Mexican opal but lately there have been many inquiries for the mineral, here in America, so it is hoped the mines will soon start up again. The mines are not near Queretaro at all, according to Eddie, but some distance away — the opal is brought to Queretaro to polish and sell and this is how the city became associated with the gem.

Don bought a few rough opals but they were nothing extra even though the best Eddie had in stock. I, too, bought a few specimens such as turquoise, fluorite, rock crystal, amethyst crystal, and a facetted amethyst containing a movable bubble (see "A unique amethyst gem", by Peter Zodac, *Rocks and Minerals,* June, 1948, p. 509).

Eddie then took us on a tour of the city, first to a Senora Zacarias, who had many beautiful cut opals for sale (Don bought a few), then to Senor Ugalde who cuts "gems" out of common glass. Eddie took us also to a monument built for former Emporer Maximilian (spot where he was shot), and to the Church of Santa Rosa de Viterbo which contains the oldest clock in Mexico (a beautiful old church). We visited also the markets (most interesting), and other places.

The glass "gems" made by Senor Ugalde were of special interest to us as we had seen many of them and were curious as to their origin. It seemed that no matter where we stopped (within 50 miles or so of Queretaro) someone would have them for sale as genuine gems. Pull up at a gas station and the first thing the attendant would do was to bring out some glass gems to sell you. Stop at a restaurant or hotel and someone would halt you on the way in, to sell you gems. Even if you managed to park along an apparently deserted road to admire scenery, a head would pop up from nowhere and a boy would soon be showing you beautiful gems for you to buy. Though the gems were really beautiful, you could see easily that they were glass. There were yellow "topazes", green "emeralds", colorless "diamonds", purple "amethysts", etc. The prices asked started at 10 pesos but gradually dropped down to 2, and that was for small or medium size gems. Through Eddie, we not only learned who made them but actually saw some being made by Senor Ugalde and his young nephew. We were so nicely treated by Senor Ugalde, that we each bought 5 of his largest gems (40c each).

We had read a lot about opals being offered for sale to tourists in Mexico but not a single one was ever shown us. The only gems offered us were the glass ones and for minerals, the rock crystals near Tamazunchale.

Before retiring for the night, I spent at least 2 hours sitting in the little iron balcony (in front of our room) overlooking the street and enjoyed the sights. The streets were crowded with people, vehicles, and animals. I would see men and women dressed according to American standards — the girls, if in a group, would be chattering away as they do at home. Men in white Mexican dress with sombreros on their heads and bright colored sarapes on their shoulders, made

a picturesque appearance. Then in review would pass some poor natives — dressed in rough, torn clothing, all barefooted whether young or old, and either balancing heavy loads on their heads or carrying heavy loads on their backs — these natives would range from very young boys and girls to old men and women. Cars were numerous and there were many nice ones; also trucks. Even oxen were seen. As for burros, the little animals were numerous too, carrying heavy loads. One sight actually made me laugh and I chuckled over it for many days. I saw a tall man riding a bicycle with a huge basket loaded with bread balanced on his head. The basket, which must have been 6 feet in diameter, he steadied with his right hand while his left held the handle of the wheel. It was most comical to see him wiggle in and out of the heavy traffic without stopping once or spilling some of the basket's contents.

Mileage for the day—121.

14th DAY
(Sat. April 24, 1948)

A large church (San Francisco) was just across the narrow street to the right of the hotel (hotel was on a corner) and I went to the 7:00 a.m. Mass—my first in a foreign country. The church was beautiful inside and the service was just like at home, except for the frequent communions given. During the half hour I was in church, communion must have been given about 7 times — before, during and after Mass. Most of the communicants were poor Indians and it is my belief that they have no clocks and thus have no idea of time. They just wander into church at all hours in the morning and the Priests are ready to serve them as they come in.

2636.0. Queretaro. We left the hotel at 9:30 a.m.

2638.0. Stopped at the aqueduct on outskirts of the city to examine some pebbles — nothing of interest except a small specimen of obsidian.

2648.0. Obsidian locality again. We stopped in the hope of collecting better chalcedony but did not, however, some that I collected fluoresced greenish under the Mineralight (material collected yesterday did not).

2669.0. San Juan Del Rio again. Don remembered the turns made yesterday (how he did is a mystery) so this time we did not hire a taxi but went direct to Tequisquiapan (2683.0 mileage) and found the dealer awaiting us. I cannot recall his name as the card given me has been mislaid, but he was a very fine old Spanish gentleman who knew a little English. He received us cordially. He had no opals to sell but offered to take us to a working mine.

The opal mines we were to visit lie 6 miles north of Tequisquiapan. There are 100 mines in the district, we were told, but none at Queretaro.

We got into Don's car and headed northward on a poor dirt road through a very flat sandy plain. Dirt roads branched in all directions but with a guide in the front seat we were on the right one all the time. Finally we came to a long rambling ranch house and here we stopped and parked (2689.0 miles) — the mines were only a few hundred feet away on the side of a gently dipping hill. Our guide spoke to someone in the ranchhouse, and we then headed for the mines.

The mines turned out to be 2 small pits about 500 feet apart. The first one was about 125 feet long, 50 feet wide, with a face 25 feet high. Very little opal was seen but beautiful banded rhyolite was plentiful. Some nice common opal, whitish masses of chalcedony, and loose black glassy masses of obsidian were also found. No obsidian was noted associated with rhyolite and as obsidian pebbles were also seen, it is apparent that the glassy rock is not native to the immediate vicinity. A colorless botryoidal hyalite opal as an encrustation on bluish chalcedony in cavity of rhyolite, was my best find. The hyalite was later found to fluoresce green under the Mineralight.

The second pit was much larger, being about 150 feet in diameter and 15 feet deep. It was in operation and its 3 miners watched us with evident curiosity.

The banded rhyolite seen here was extremely handsome and especially when

associated with red cherry opal. There were tons of it stocked in the pit but whether it was waste material or gem material (to be sold) I could not learn from our guide. Nor could I learn if he owned the mines, or leased them, or just bought opal from the miners. It may be that he was a dealer years ago, had retired, and took us out just to please us.

The material was so unusually beautiful in this pit that we both wanted to buy an assortment, we to pick them out. "No, no, no," said our guide, "no money. Take what you want. No pay!" Unknown to our guide, we had seen him slip the men some money (perhaps to pay for the few specimens we had collected) and so we could not impose on him. His offer was most tempting as never before had we seen such beautiful material as at this opal mine and though we would gladly have purchased at least 25 pounds or more each, we walked away with only 4 specimens between us, one in each hand. I had 2 beautiful specimens, each 2x2; one was a red cherry opal in rhyolite, the other was fire opal with cherry opal in rhyolite. True the specimens did not cost us anything and when compared with our trip to the diamond mine near Murfreesboro, Ark., (see R&M, July-August, 1949, p. 351.) where we were not permitted to pick up even one pebble, the opal mine trip was most successful. The visit to the diamond mine, however, was a side trip, but the trip to Mexico was made especially for opals — we had traveled over 2600 miles and all we had to show for it were 4 small specimens whose market value might be $10.

About half-way between the two pits was a 10-foot basalt dike but no minerals were seen in it.

2695.0. Tequisquiapan again. Here our guide entertained us at his home with refreshments and the showing of some cut opals from his collection. As we were leaving, Don offered to pay him for his services but the nice old gentleman would accept nothing.

2708.0. Del Rio again.

2731.0. Hyalite locality again but we did not stop.

2765.0. Junction with Pan-American Highway, we turn right on it.

2770.0. Ixmiquilpan again. Got gas here. Ate lunch at Dobbs Restaurant.

2794.0. Actopan, small town.

2800.0. Some rocky crags, called "Los Frailes" (the Friars) seen to left.

2810.0. Rt. 110 to left to Pachuca, 9 miles away. Pachuca is one of Mexico's oldest silver mining centers.

2812.0. At K 90 is the highest point on the entire Pan-American Highway between Laredo and Mexico City — 8,207 feet. Monument, right side of road, was erected in 1936 by American Colony of Mexico.

2862.0. Mexico City.

We had been told that English-speaking guides met motorists on the outskirts of the city to take them to their destination — hotels, tourish courts, etc. We reached the city about 9:00 p.m., and not a guide was there to meet us. The highway forks on the outskirts of the city — we took the right fork. We were heading for Shirley Courts and believing guides would meet us or we would see direction signs, we had not studied our maps at all. As we got deeper and deeper into the city, and no direction signs could be seen, we finally parked our car at a corner, dug out a map, and tried desperately to find the courts at the same time to locate ourselves in reference to them. The map was difficult to read, due to poor light, and we were in a fix. Suddenly a most welcome voice was heard. "Can I help you, gentlemen?" We both looked to the right and there stood a pleasant faced young man, alongside our car. "I am a licensed guide," he continued," and seeing your Tourist sign on the windshield, I assume that you may be in difficulty. If I can help you, just say so."

Were we glad to see him! And did he help us! He not only got in the car and drove us to Shirley Courts, several miles away, but saw to it that we got a cabin — and he would not take a cent for his service.

2869.0. Shirley Courts, Mexico City (Got cabin 57).

Mileage for the day — 233.

(to be continued)

MINERALS

By WILLIAM C. CASPERSON
Curator, Paterson Museum, Paterson, N. J.

(See Report of the North Jersey Mineralogical Society under Club and Society Notes.)

Not long ago I was asked by a representative of one of the leading publishers of scientific books what was happening that evinced so great and wide-spread an interest in Mineralogy. I replied that the importance of minerals was just now being realized fully for the first time. Of course, there always have been those who were interested in minerals for many years past. Gems and precious and ornamental stones have practically always interested mankind. In many cases the valuations placed on stones by ancient man correspond with the evaluations of today; the ruby, the emerald, and the diamond have always stood foremost among gems of value in ancient times as they do today. The science of Mineralogy dates back to hundreds of years and through the years mineralogists and collectors have found pleasure and profit collecting beautiful and interesting mineral specimens.

Today the attention of the whole world is keyed to the magic word "Mineral." Minerals are found in many beautiful formations. The quartz crystal with its clear-cut faces and its symmetrical termination is a thing of beauty. I have been asked, "Did this actually form in Nature as we see it?" It is almost inconceivable that such beautiful formations could happen in Nature, and with such uniformity, that a given combination of elements would invariably produce the same crystal form. It certainly is indicative of a uniform law of association, fashioned by a master intelligence.

Not only are minerals important because of their great beauty, but also because of their place in the economic life of man. Minerals are the basis of our chemicals. Industry depends on minerals for their products which make for our comforts and conveniences. And in the science of Biology, minerals are recognized as all-important for the life and growth of vegetation and for the health of the human race. We measure our meals by the minerals our diet furnishes and it is becoming more and more evident that health depends on the right proportion of minerals within our system. And thus, we are becoming ever more conscious of the meaning of minerals as we now harness the atom's disintegration to find power for war and peace.

Minerals are the stuff of which the solid parts of the Universe are composed. Rocks, in their composition, are minerals arranged by the influence of some outward controlling factor. For this reason, minerals making up the rocks do not follow any definite and prescribed formal arrangement. Minerals, on the other hand, owe the lattice pattern of their structure, both externally and internally, to the functional arrangement of the units of which they are composed. This arrangement is governed by the field forces of the various unit groups composing the minerals in which the deposition of elements, making up the minerals, follow the magnetic field pattern of the atom groups. In this way the mineral represents the formal and symmetrical pattern of field forces in their interdependent relations, beginning with the atoms themselves and extending on through the intricate interrelations of atom groupings.

The great variety of mineral compositions and forms is evidenced in the nearly 2000 definite species which exhibit individual characteristics in the chemical or physical composition. Of most of these species there are many types which still further multiply the number of distinctive mineral specimens. Again, this number is multiplied by the varieties of types which, altogether makes the total number of mineral specimens each having some distinctive and individual characteristic almost inexhaustable.

One of the problems of the collector is to know when to limit his collection to a given number of specimens of a certain specie, type, and variety. So often it is

difficult to reject a certain specimen which represents some distinctive peculiarity even though the variety of type is well represented in the collection.

For the scientific treatment of minerals it becomes necessary to formulate some kind of classification. Of classifications, the one by Dana is the most widely used. This classification is based on the chemical composition in which distinctions are marked by the number of atoms of given elements present in the atom groups or molecules of a mineral. Thus, quartz is composed of silicon and oxygen in the ratio of one atom of silicon to two atoms of oxygen in every atom group or molecule, and this formula is written SiO_2.

A system of classification is being formulated which is based on a physical rather than a chemical differentiation. This system attempts to arrange minerals according to the physical structure of matter itself. In so doing, to be dependable and of permanent value, it must conform to a true science of the atom structure. This is impossible so long as a merely theoretical atom structure is used in the formulation. Consequently, until the true physics of the atom is recognized such a classification is bound to be superficial and of mere temporary significance. It would seem better to follow the acceptable chemical classification which, until the true science of the atom is recognized, will remain the most satisfactory. The system of classification by Dana is followed in "Dana's Text Book of Mineralogy," Fourth Edition, by W. E. Ford, Published by John Wiley and Sons. An exhibit of minerals arranged under this classification may be seen in the Paterson Museum, consisting of over One Thousand mineral species.

Minerals are also classified according to the form of their crystal structure. The systems which have been established under this classification are — the Isometric; Tetragonal; Hexagonal; A — Hexagonal Division, B — Rhombohedral; Orthorhombic; Monoclinic; and Triclinic.

Other classifications are also important in the identification of minerals, such as Hardness, Color, Taste, Odor, Cleavage, Fracture, Ductility, Weight or Specific Gravity, Luster, Brittleness, and relative Density. Sometimes it is necessary to employ more than one of these tests to identify a mineral.

Optical characteristics are of leading importance in mineral identification and sometimes the optical test is the only means of identification. In the optical examination the internal structure of the mineral can be observed and its characteristic properties determined. The petrographic microscope and the electron microscope reveals the secrets of growth and structure, while the refractometer reads the indices of refraction and the goniometer measures the angles of the faces of the crystals. The polarizing microscope lets us into the secret of the mineral's structure by the angle of reflected light and the X-Ray pierces the very privacy of the mineral to show the pattern of its lattice structure.

Recent interest in the property of radioactivity has popularized the Geiger Counter which measures the degree of radioactivity which minerals possess. Another test of the radioactivity of minerals consists of placing the specimen on or near a sensitive photographic film or plate and observing the action of the radioactive emanations or gamma ray impulses on the plate or film thus exposed. A smooth face of a mineral placed in contact with the film will produce an exact picture of the radioactive surface on the film. Proximity of a radioactive mineral to a film or plate will result in the blackening of the film or plate.

Of considerable importance in mineral identification is the application of the high and low frequency activators which produce fluorescence. Here is not only a beautiful phenomenon which gives great pleasure to collectors due to the gorgeous colors, but it furnishes a very definite means of identification of a large number of minerals.

While on the subject of identification it is appropriate to mention the blowpipe, the use of acids, and the actual chemical analysis and assay for the determination of minerals and their contents.

Some idea of the value of minerals in our economy may be gained from the

statistics which show that in the year 1947 minerals and mineral products in the United States reached the tremendous monetary value of well over $12,400,000,00.

In keeping with the increasing widespread interest in minerals is the new interest which is being awakened in the study of minerals in our public and private schools. Activity in the organization and growth of mineral societies express the growing interest in minerals of the thousands of collectors throughout the Country.

LET ME TAKE YOU ON A ROCK TRIP

By A. A. PORTER

6515 Tacoma Ave., Tacoma 4, Washington

If you are hale and hearty, then let's make ready for a Gem Collecting trip to my favorite hunting grounds.

I say, hale and hearty because it involves a hundred mile ride in a car, then a hike of three to ten miles, according to your physical ability.

We will start from my home in Tacoma, Washington, take the Mountain Road to Elbe, cross the Nisqually River and on to Morton and Randle, Then take the Cispus River Road. About three miles out of Randle we enter the Columbia National Forest, continue on to the Upper Cispus, 22¾ miles from the little town of Randle. Here is where we camp and the East Canyon trail leaves the road. The trail and the road junction is just inside Skamania County. East Canyon creek is the outlet to Council and Takhlakh Lakes and about twelve miles from the lakes to the Cispus River. A good forestry trail parallels the stream all the way. The setting is just below Mt. Adams.

A good pack sack is essential for the trip as there is much good material to pack out. My load usually runs from thirty to eighty pounds, as a fair example.

The material from this area is collected from the stream gravels, and is AGATE, JASPER, SARD, PLASMA and some very nice GEM ZEOLITE. The Agate runs in a wide variety from white, red and green plume to IRIS, MOSS of many colors and blacks comparable to Montana Agate, Fortification, banded and plain blues of many shades. The JASPER runs mostly to reds and red moss. I have several hundred pounds collected, some is very choice material.

The stones run in size from small hunks the size of your fist to one beautiful brown and black mass that lies in the stream which weighs over a ton, even after some pieces have been broken off. I have displayed a case of about one hundred cut and polished stones from East Canyon Creek at the last two Northwest Federation Conventions, with much favorable comment. This locality has never been published outside of our club paper, *The Puget Sounder.*

This area has a real drawback in that it is in a Fire Hazard area and is closed from July first to October first each year by the Forestry Department. The best times to go into this locality is the last half of June and the first half of October. Spring and Winter is out on account of too much water.

The hills lining the headwaters of East Canyon Creek are very rugged, but a road is open on top of the ridge, which should make prospecting the ridges easy. Who knows we might open up a great new gem area from the float in the creek.

The trail crosses a deep and beautiful canyon on the Cispus River which is deeper than it is wide. Beautiful and majestic trees line EAST CANYON CREEK.

Any further information will gladly be given by the writer.

OUR TRIP TO THE YARRANGOBILLY CAVES — AUSTRALIA

By N. H. SEWARD
Melbourne, Australia

Having packed our car with all necessary equipment (including tent and camp beds in case of need), my wife and I set out on our long journey. First we visited our National Capital City of Canberra. Then we toured on to the great and wonderful city of Sydney, with its beautiful harbor, winding inland for miles, the shores studded with thousands of beautiful homes. Across one arm of this harbor, near the heart of the city, was the marvelous Sydney Bridge, one of the greatest bridges in the world, the mighty arch rising hundreds of feet above the water, and hundreds of feet across, and carrying a vast amount of traffic of every description.

After a few weeks in Sydney we toured southwards down along the coast, staying at various seaside resorts, till at last we turned inland and plunged into the very wilds of New South Wales. Up and down mountain sides, splashing through no less than eight mountain streams of running water, up Brown Mountain for ten miles (till our engine was nearly boiling) and then for three or four miles away down into the depths, with the mountain towering up on one side of the narrow road, and deep ravines down below, till at last we reached the most wonderful sight of our whole trip —

"Deep down beside a mountain stream,
with its rushing sparkling waves
There lay in all their splendour,
the Yarrangobilly Caves".

Location of Caves

The Yarrangobilly caves are in the Talbingo Ranges, 47 miles south from Tumut and 65 miles northwest from Cooma. The belt of limestone in which the caves are situated is 6 to 7 miles long and a half mile to one mile in width, fronting the Yarrangobilly River, a tributary of the Tumut River.

The caves are in the southern part of New South Wales, about 215 miles southwest of Sydney.

The Caves

The caves are adorned with magnificent stalactites and stalagmites said to excel in beauty and size those found in any other Australian limestone cave.

Among the caves that are opened to the public and which are much visited are the Glory Hole Caverns (electrically illuminated) 100 feet from the Caves Hotel and whose special features are the sacrificial altar and the Sentinel; Jersey Cave — (electrically illuminated) about 600 yards from the Hotel; Harrie Wood Cave, about three-quarters of a mile from the Hotel; the Castle Cave, about a mile from the Hotel; the Jillabenan Cave, about 400 yards beyond the Jersey Cave.

History of Caves

In 1838, Mr. J. Bowman who had a homestead about 4 miles from Yarrangobilly Caves, while looking for straying cattle, in seeking shelter from a thunderstorm, discovered the Glory Caves.

The Caves Reserve

The Yarrangobilly Caves Reserve has an area of approximately six square miles. The frontage of the great limestone belt to the Yarrangobilly River is singularly impressive, huge precipices and battlemented outcrops extending for miles. Two miles above the Hotel the waters of the river have cut through the limestone, forming a natural bridge. On the top of the plateau a curious weathering of the limestone has occurred, forming a labyrinth of gigantic pinnacled rocks. The great cliffs are pitted with holes and crevices, many indicating entrances to unexplored caverns, with which the limestone is honeycombed.

The Caves Hotel

Yarrangobilly Caves Hotel, set in scenic surroundings, offers a homely welcome to the visitor. Electric light, hot water, and septic sewerage are installed. The Hotel is 3,200 ft. above sea level.

Exploring the Caves

These caves are quite beyond descrip-

tion, and can only be seen to realize fully these wonderful and beautiful marvels of Nature —

"Stalactites and Stalagmites in marvellous array
Rare beauty formed through countless years, in glorious display".

We entered a dark tunnel or passage, leading into the bowels of the Earth, and our guide switched on a series of powerful electric lights, and there before us and around us and beyond us we saw an amazing sight —

"Natural hidden beauty, — a phantasy sublime,
Water ever dripping through rock and stone and lime,
A fairyland of wonder, like lace, or trees, or heath,
Descending from the roof above, ascending from beneath".

Later on the same evening we strolled along the mountain side, along a narrow footpath, not knowing where it was leading to, till turning a bend in the path we came to the enormous entrance of another huge cave. It seems that a Stockman was out one day, driving some sheep or cattle along this track, when he came across this huge cave, vast enough to shelter hundreds of cattle, or thousands of sheep. Away up, hundreds of feet, in the roof of this cave, was a great hole, where the earth had fallen in, and the sky could be seen beyond, whilst at the far end, in the dark recesses of this outer entrance, lay the main entrance to the marvels beyond.

Another interesting feature of this Caveland, was a rushing stream, just in front of our Guest House but instead of rushing past the house, the stream dived underground, and evidently dashed down into some underground river.

Leaving this wonderful cave district, full of many other caves not yet discovered or opened up, we turned our way homewards, and in due time safely reached our home in Melbourne once more, after a most interesting tour of many hundreds of miles.

NEW BONUS OFFERED FOR URANIUM DISCOVERY

The Detectron Company has just announced an award of $1,000 to be made to the first person who makes a high grade uranium discovery with their famous DG-2 Geiger counter. To qualify, the discovery must qualify for the $10,000 Government bonus. This makes the total reward now offered $11,000.

The DG-2 Geiger counter is a compact portable unit weighing 5 pounds. It utilizes low cost portable radio type batteries and has a beta shield for segregation of soft radiation. The 3 way signal system, intensity meter, count indicator and double head phones, gives a triple check on any radioactivity which may be present. The DG-2 is in the low price field and also carries a one year guarantee.

Full information on the $1,000 award and the DG-2 will be sent by return mail by writing to the Detectron Company, 5637 Cahuenga Blvd., Dept R., North Hollywood, California.

No Duds in Rocks and Minerals!

Editor R&M:

Just finished reading the May-June issue of *Rocks and Minerals* and am anxious to get more of your trip to Mexico. The whole number is good, in fact I think *Rocks and Minerals* is always good and I look forward to each number with somewhat the same feeling I have when sawing into a new specimen to see what it is like inside and as few of them are "duds" I know I am always going to get a lot of good from each issue of the magazine.

I always find my R. & M. A. membership card is of great help in breaking the ice with mineral dealers and fellow rockhounds.

D. E. Wells,
Salina, Kansas.

June 14, 1949.

Wants Copy Rushed!

Editor R&M:

I sincerely hope this remittance reaches you in time for the next issue of R & M because I do not want to miss a single copy of this information-packed little volume. Keep up the good work and rush me the next issue as soon as the ink is dry!

Edward Seeley
Everett, Mass.

June 16, 1949

His Favorite Magazine!

Editor R&M:

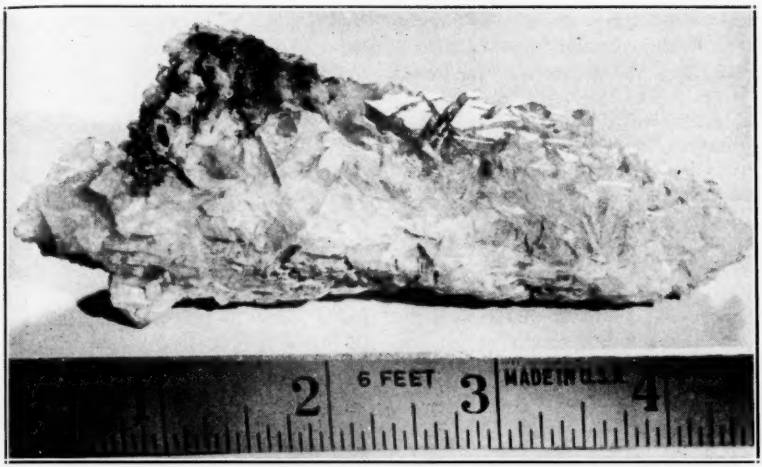
Enclosed is $3.00 for another year of my favorite magazine.

John Finlayson
Marietta, Ohio

Aug. 6, 1949

AN UNUSUAL MINERAL SPECIMEN FROM NEAR RAVENA, N. Y.

By HOWARD V. HAMILTON
187A Franklin Ave., Vandergrift, Penn.



The strangled quartz crystal from near Ravena, N. Y.

While driving along U.S. route 9W, I stopped at a small limestone outcrop a short distance south of Ravena, New York. In the soil and rock fragments at the base of the exposure a very unusual specimen was found. It is a semi-translucent, milky quartz crystal, approximately 4-¾" in length by 1-¼" in diameter. It has three surfaces which correspond to prism faces, ⅞", ¾", and ⅝" in width respectively, however, each surface shows more than one parallel plane. The remaining surface, where the other three prism faces should be, is roughly semi-circular. The tip of the crystal is sloped much like a normal quartz crystal, however no distinct pyramid faces are shown. Sandy material is included in the base and in an irregular mass attached to the base parallel to the main crystal. Many channels of varying sizes cut the surface of the crystal (at least 50 were counted) but these seem to have no definite orientation in relation to the crystal or to each other. Several channels were noted over ½" in length, several others ⅛" in width, and several others ⅛" in depth, however most of the channels are smaller.

Mr. O. Ivan Lee of Jersey City, N. J., refers to this type of specimen as a strangled crystal. It is possible that other mineral crystals or perhaps fossils prevented the solution of silica from finishing its task of forming a complete quartz crystal, and, when this material was later dissolved out, an imperfect channeled crystal remained.

WEST ROCK TUNNEL, New Haven, Conn.

The 1,200-ft. twin bore auto tunnel through West Rock, near New Haven, Conn., is nearly completed, and will be opened about Nov. 1st. Has any reader of *Rocks and Minerals examined* the large amount of rock taken from this working? If so, will he very kindly inform other collectors through the medium of these pages? This is really a job for the Editor, but unfortunately he overlooked a good bet on behalf of his readers.—T. O. L.

NO. JERSEY SOCIETY VISITS ROXBURY STA., CONN

Twenty-six members and friends of the North Jersey Mineralogical Society recently visited, as their last field trip for the summer, the locality of the old siderite mine in Roxbury Station, Connecticut.

It was at 8:30 on that Saturday morning of July 9th, 1949, that most of the group assembled in cars before the Paterson Museum. Here, at the starting point of the journey, the various routes over which one might travel were made clear, and the Roxbury Railroad Station was agreed upon, as the designated meeting place for all prospectors.

With Alfred G. Coxley guiding the way for those not too familiar with the trip, the mineralogists proceeded to their destination along an interesting route, well chosen by their able and careful leader.

Traveling to Ramsey, N. J., and on into New York State, the little group soon found themselves turning in on Bear Mt. Road for a beautiful scenic drive among Bear Mountain's lovely woodlands and placid lakes. Lake Tiorati, in particular, reminded one of happy outdoor vacation experiences, for rustic little cabins dotted the shore here and there, and activity in rowboating and fishing could be seen.

The journey continued past Bear Mt. Inn and Trailside Museum, over the Bear Mt. Bridge, along route 6 to Lake Mahopac and Brewster, N. Y., then to Danbury, Conn., Brookfield Center, and Bridgewater; and finally over route 67 toward the Roxbury Railroad Station,—journey's end.

But where was that Roxbury Station for which the group was heading? It simply could not be found! All that was seen at the former railroad site, was a lumber yard, and the anxious mineralogists became somewhat bewildered and amazed!

Seeking information from some good natured men who were working at the lumber yard, it was soon learned that the Roxbury Station had been abandoned. Gladly the lumbermen related the story of the change and helpfully directed the confused mineralogists toward the direction of their quest.

But it was dinner time and as part of the pathway to be taken on foot was a steep upgrade it was decided that cars be parked and lunches be eaten.

Given permission, the party promptly drove along a little path leading into the lumber yard and parked its cars in the grassy section directly opposite the company's office, not far from the banks of a quiet stream (Shepaug River). Walking down, almost to the water's rocky edge, the little group found a cool and shady nook under some tall trees and there seated themselves on the grassy floor to enjoy an outdoor feast.

Peaceful and quiet it was, as one sat there, to look out upon the stream, the grass-covered island, and the little dam to its right; and then, to watch two of God's care-free feathered creatures, — robins, as they occasionally flew back and forth from island to tree.

But Paul Kellinghausen of Elizabeth afforded a few humorous moments when he perched in the crotch of a tree and endeavored to take pictures of the group. Taken in so shady a place, one wonders how successful these pictures can be!

After these brief but happy moments of relaxation, lunch kits were put away, and prospector's tools (hammers and chisels) quickly took their place. The real work of the day was about to begin.

Leaving the cars parked where they were, the mineralogists headed for the main ore dump of the old siderite mine, continuing for a short distance along the path that led into the lumber yard and through it, and then branching to the right when the fork in the road was reached.

Startled and thrilled the hikers were, at the sight of garnet crystals lying loosely all about these roads. Handfuls of dull red, opaque garnets, both single and compound, could be had without any effort, merely by poking around a little in the earth, or simply by picking them up. It

was here that Herman Grote of Newark found some fine garnets in natural matrix, and where Katherine Kauth secured her pretty twin garnet crystals. Nevertheless, in all humility, says Karl Zauzig of Paterson, "I still think I have found the nicest of all the garnets!" (These garnet crystals came from the abandoned garnet mine at nearby Roxbury Falls whose waste dump is being used as fill for roads — Editor.)

After walking a quarter of a mile, the hike came to an end, for the destination had at last been reached. Turning to the left of the road and looking upward, one could see amidst tall trees and much vegetation, the ruins of the old mine's smelter, also the pathway that led upward to the mine's main ore dump. It was a steep climb that the group now faced and before approaching, a posted warning that trespassers ascend at their own risk, was read. Dodging between the barbed wires of a fence, the ambitious mineralogists carefully began their climb, first past the ruins of the old furnace, then, without stopping to investigate, to a higher level where the crusher at one time stood, and finally, after continuing farther to a still higher level about 200 feet beyond, they reached the place where the main ore dump of the siderite mine lay. Here, the mineralogists spent most of the day, for the pickings were both numerous and fine.

Without exaggeration, it might well be said, that wherever the eye chanced to look, or the hand began to dig, atop this bountiful carbonate ore dump, some specimen of siderite could be found.

While working about in the ore, it was noted that most of the siderite had a dark reddish-brown appearance, the result of oxidation after much exposure to the atmosphere. Upon breakage, the new fractures were lighter in color, ranging from yellow to tan.

Pyrites likewise, were plentiful. In two instances, loose pyrites were found simply by running the fingers through the earth, and to see streaks of minute pyrite crystals in the siderite, was not uncommon. "Whenever such streaks are seen in the siderite, it is wise to break open the specimen," Mr. Casperson told one of the members, "for one never can tell what pleasant surprise may be waiting inside. A large golden pyrite may possibly be there!" Frequently, in the dark brown pieces of siderite, pretty pyrite crystals with a tarnished-red cast or iridescence were found, while the yellow or tan siderite contained the golden-colored or untarnished ones.

Quartz crystals, some quite large in size, were also seen embedded in the siderite.

Of the sulphide ores, only a few specimens were located, intermingled with the siderite, namely galena, (the sulphide of lead) and sphalerite, (the sulphide of zinc.

Unceasingly the prospectors toiled through the heat, until 3:30 in the afternoon. Then a pause in the day's occupation came, for word had been brought by a stranger, that some members of the society and their friends, were at the Roxbury Siderite Mine on Mine Hill, waiting for the North Jersey Mineralogists to appear, and, since the hour was late, and the mineralogists had not yet arrived, were very disappointed. It was evident that an error had been made, and that the trip's destination had been misunderstood.

Most of the mineralogists were tired and weary by this time, and yearned for a little rest. But a few still energetic ones there were, and these immediately set out, over a rather easy path, for the Roxbury Mine, one mile distant, anxious to cheer the disappointed folks and curious at the same time, to know what further finds the old mine had yet to offer.

Those that remained at the dump, took things easy a bit. Some seated themselves on rocks in the shade of the nearby trees, while others less vigorously carried on their prospecting. It was during one of these less vigorous moments, that Curator Casperson accidentally discovered a slender pair of terminated quartz crystals, 1½ inches in length, as he playfully poked around in the earth.

A little more than an hour had passed, and those energetic mineralogists returned from the mine, bringing with them the

lost party. Nothing of further mineralogical importance was secured at the old mine, but to the prospectors, the draft of cool air about its entrance, was certainly refreshing on a hot summer's day.

It was now almost five o'clock, and the group gradually began to assemble for the trip back to the lumber yard. Just at this point, Katherine Kauth, who had been relaxing for a while, was seen hammering away at an unusual-looking rock, with all her might, making one last effort to secure for herself, a pyrite of goodly size. It seemed as though the rock would never break. Harder and harder she whacked. At last a crack appeared and the rock broke, but not a thing of mineral worth was inside. Turning the rock on end to examine it more closely and finally pushing it to one side, she suddenly beheld in the groove from which it was removed, a dark brown piece of siderite with a beautiful pyrite crystal exposed, approximately ½ inch in diameter and perfect in every way. Further inspection of the specimen brought to light several other tarnished crystals. This was a wonderful find!

"Where there is one such specimen, there must be others," said Paul Kellinghausen who had just come near; so, scratching around and digging a little deeper in the same spot, he too, brought forth a surprise, a lovely specimen of siderite crystals. With these two surprising incidents, prospecting for the day, came to an end.

Along the slope, the group slowly descended, and onward they hiked till the lumber yard was reached.

Here, at the lumber yard, the mineralogists lingered awhile, before departing for home. Some proceeded to the water's brink to wash their rust-stained hands, while the Coxleys enjoyed a delightful and most refreshing swim. Others gaily discussed the events of the day, and related to one another, interesting stories of their various finds. And thus it was, while conversation was taking place, that the following additional items of interest were made known. It was learned that Joseph Skaritza of Hawthorne had found a fine specimen of galena; that Hazel Terhune of Fair Lawn had been the first to locate sphalerite at the dump. Katherine Kauth has in her possession, a nice piece of sphalerite with siderite intermingled. George Stevens of Carlstadt obtained specimens of pyrite and iridescent ones. Likewise, Paul Kellinghausen told of some lovely iridescent pyrites he had obtained. From the assistant curator, Miro Bianchi, one heard that he had secured quartz in a pocket and from Wm. C. Casperson, that he had found a splendid piece of siderite with two large quartz crystals embedded within. He also produced a staurolite specimen in schist together with a large weathered garnet, which he explained, was found in the road. Such was the conversation heard at the lumber yard and as it waned, the mineralogists repaired to their cars, for the journey homeward.

By this time, the need for a little refreshment was felt, so together they drove to a nearby store adjoining a service station. Here, they enjoyed themselves for a few more moments, drinking coffee or soda, or eating ice cream.

Finally came the farewell, and, bidding each other goodbye, until the next mineralogical meeting in the Fall, they parted, traveling along devious routes, most convenient for themselves.

But those in the car of Gustave Wendt, and the ladies in Lillian Kane's car, continued the journey homeward, together, this time, with Mr. Wendt leading the way. Toward Danbury they traveled. Then along route 7 they drove, but it was not for long, for they soon spied a quiet little picnic grove at the side of the road; and here they turned in to eat, for it was supper time.

How merry and contented-looking were these mineralogists, as they sat about one of the picnic tables, sharing whatever food remained in their lunch kits and quenching their thirst with the bottled soda Hazel Terhune had brought.

Having had this delightful assorted evening snack, they continued on their way, this time without further delay. The journey now took them through the Connecticut towns of Branchville and

Wilton, and as they rode along in the direction of Merritt Parkway, they watched a beautiful sunlit sky of ever-changing colors and clouds, gradually fade away into the darkness of night.

And so—traveling onward through the darkness, over the Henry Hudson Parkway in New York, and across the George Washington Bridge, now gleaming with evening lights, they at last, safely reached their individual homes.

Thus, a long and enjoyable day of prospecting and sociability, came to a close.

Katherine B. Kauth
Member of the Publicity Committee
North Jersey Mineralogical Society
Paterson, N. J.

August 3, 1949.

BIBLIOGRAPHICAL NOTES

The Long Crooked River, by Richmond E. Myers.

This is a story of the Susquehanna River and the valley through which it flows. Though the river rises in New York and ends its course in Maryland most of it flows through Pennsylvania and the story is chiefly about the latter state.

Mr. Myers is a geologist. On a number of occasions he has worked in the Susquehanna Valley and in the course of time had accumulated a large number of geological notes. Along with the geological notees he had accumulated also a large number of historical notes pertinent to Indians, traders, missionaries, soldiers, and many other groups who had roamed through the Susquehanna Valley many years before him. Mr. Myers is also a native Pennsylvanian and becoming fascinated with the river and its historical past, assembled his notes together and "The Long Crooked River" is the result.

The book is intensely interesting. It describes the Susquehanna River and its valley, both geologically and geographically. It takes up the early settlers and traders of the valley, the Indians they had to contend with, early towns, forts, ferries, lumbering, iron mining, and other industries of the past.

Whether one is a Pennsylvanian or not, if he is in anyways interested in the Susquehanna River and its valley, he should get this book as its contents will prove delightful reading. All readers residing in the Susquehanna Valley should buy two copies—the extra one for their Public Library.

380 pp., Price $4.00.

Published by Christopher Publishing House, 1140 Columbus Ave., Boston 20, Mass.

Geology: Principles and Processes, by William H. Emmons, George A. Thiel, Clinton R. Stauffer, and Ira S. Allison.

Geology is the science which treats of the history of the earth. In the book, the authors give the reader a good outline of the earth's rocks, the atmosphere, ground water, streams, ice, snow, earth movements, volcanoes, etc. Not only is the text in simple but technical style, but the many excellent photos and drawings illustrate fully the many points brought out by the authors.

This is the third edition of a very successful text book for college students. Thoroughly revised and enlarged, many new and improved illustrations and up to date reference to source literature added.

502 pp., 488 figs. Price $4.50.

Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

Report of the Committee on the Measurement of Geologic Time, 1947-1948: John Putnam Marble, Chairman.

Presented in preliminary form as Appendix 4 at the annual meeting of the Division, April 23, 1949.

The report contains an annotated bibliography of articles relating to the measurement of geologic time, and supplementary reports on the works of various authors.

77 pp., price $1.00.

Issued by the National Research Council, 2101 Constitution Ave., Washington 25, D. C.

Minerals Unlimited Issues Catalog

Fine Minerals from Minerals Unlimited is the title of a new price list just issued from Minerals Unlimited, 1724 University Ave., Berkeley 3, Calif. It is a 31-page publication, listing minerals alphabetically. The minerals listed come from all over the world (the five continents and some islands) and many are very desirable items. Send for your copy today so you may rush an order before the choicest specimens are all gone!

Albanese Issues Foreign Price List

John S. Albanese, P. O. Box 536, Newark 1, N. J., has just issued a special price list on foreign minerals. It is a 6-page publication, listing minerals alphabetically from all over the world (the five continents and many islands). Some minerals listed come from Egypt, Kenya, Uganda, etc. Have you specimens from these countries? Better rush your order for a copy of this price list so you may order some specimens before they are all gone.

RAMBLINGS OF A ROCK HOUND

By R. F. HENLEY
4075 — 19th Street, San Francisco 14, California

While the blizzards were ripping the middle west to ribbons the East Bay Mineral Society, Oakland California, held its usual monthly field trip on a balmy Sunday November 14, 1948, making first stop at Cooper's Corner at the little town of Acampo on US 50 between Stockton and Sacramento.

Mr. Cooper seems to have acquired more rocks than he knows what to do with and aside from running a grocery is disposing of some of those rocks to the rock hounds. He has enough petrified wood to build a cabin if it could be sawed up into lumber but that being impossible he has just built it up into monuments along with other material that we could not carry away because it was cemented into place. I saw blocks of mariposite, that serpentine-like grass-green and quartz-streaked stone from the Mother Lode country, containing a couple of cubic feet. Some of it was built into the front of his little rock store where he soon had the gang stripped of its loose change.

I saw big blocks of banded onyx from the Manhattan Quicksilver Mine in Napa County that we have not been able to find for years as the result of many visits by rock hounds. At noon we ate our lunches on Mr. Cooper's lawn with free coffee and grapes furnished by Mr. Cooper. The grape harvest was still on and we saw many big steel bodied hopper trucks passing loaded with grapes and bound for the local wineries.

Mr. Cooper then piloted the caravan of more than twenty cars to Valley Springs where there is an outcrop of dendritic agate. The lucky ones secured some of this somewhat milky dendrite with inclusions like ferns and trees which disclose fine scenes when cut thin.

We were also shown a deposit of opalized wood in a side cut by the railroad just west of Valley Springs but time did not permit of much prospecting there. Several holes have been dug in the bank but only one person can work at a time. The wood is a very dark brown and quite brittle and hardly suitable for cutting



Digging for dendritic agate near Valley Springs Calif.
(Left to right, in foreground, Mr. and Mrs. Ed Gilmer and R. F. Henley.)

though it fluoresces under the Mineralight.

The December 5th field trip was to Coyote Point, on the shore of San Francisco Bay opposite the town of Burlingame and only 15 miles from San Francisco and scarcely a third of a mile from the six lane Bay Shore Highway with thousands of cars whizzing by in plain sight. At Coyote Point there is a low wooded knoll rising from a flat field occupied by the Burlingame Municipal Golf Links and a Marine School so it is necessary to secure permission to visit this place, guards being stationed there. It is reached by a fine overpass and collecting can only be done at low tide so it was necessary for the party to be there at about 8:30 A.M. which was pretty hard on those who like a late Sunday morning nap. The day opened with a drizzle so I had to pass it up but some of my friends gave me some of the fine brecciated jasper that can be found there. Some day I hope to go there myself and do a little prospecting. As the collecting here was over by 9:30 A.M. because of incoming tide the party proceeded to an old quicksilver mine several miles west of Redwood City and not many miles from Coyote Point. Division of Mines Bulletin No. 136 lists the minerals to be found here as eglestonite, cinnabar, mercury, calomel, dolomite, magnesite, opal, and quartz. Because of too much moisture from overhead, all of the party did not go to this mine but of those that did, some were successful in finding some rare minerals.

Are Western Localities Being Depleted?

Editor R & M:

This is just a friendly letter in answer to your very nice letter of Feb. 15th. It will not require an answer as I know you are a very busy man.

I renewed my subscription because in spite of the many things I do not like in the magazine, *Rocks and Minerals* is still the best collector's magazine in the United States.

I do not blame the western rockhounds for not giving their new locations. For locations even as large as the Eden Valley wood and Sweetwater agates of Wyoming have been (I will not say ruined but) sadly depleted and you now have to cover a lot of ground to get a little of not too good quality material. Much of the fine material was hauled away by trucks belonging to dealers. Another depleted locality is the pigeon-blood occurrence near Cisco, Utah, that is almost a mile square. One man told me that the material from here was hauled away in trainloads. While there is still lots of agate left near Cisco, it is in small pieces and not so good. A friend of mine was the first to collect at a California thunder egg locality that covered many acres; two years later he returned to the spot and had a hard time trying to find whole eggs, although thousands of broken pieces were lying on the ground. A collector should only break one or two, to see what they are like and then take home a number to be sawed.

Any well known locality may be visited by from hundreds to several thousand collectors a year. It is almost impossible to keep a location secret. The best that can be figured on is from one to two years. The average mineral location is a small one and most of them are cleaned out by the men who find them.

Working mines do not pay much attention to specimens and some mines will not allow them to be taken. In some cases mines will make arrangements with a collector or collectors and allow them access to the property. Many times this is on a cash basis of so much a pound for material taken, which often is brought out by the miners because of their pretty color. One mine, in spite of an offer of 75c a lb. for sphalerite xls, still sends them to the smelter for 15c a lb. There are many cases of this sort.

I think news of new locations are mostly bunk anyway as I have never heard of a location being given away that was of much value. I do not know how it is in the East but here locations are from 50 to 100 miles apart. My favorite state is Nevada and you have to hunt out locations for yourself and one in ten will be good. I find the best tool for digging is the "silver pick".

I think more specimens would be found if collectors would interview local people. Many times on my trips I stop in stores, gas stations, etc., to buy something but chiefly to ask questions (not too many), show a few minerals or cut stones, maybe give some away. Most people are interested in minerals or know someone who is and in this way clues to new localities may be obtained. At any rate it is a lot of fun to talk minerals with such people.

Robert Roots,
Denver, Colo.

Feb. 21, 1949.

FLUORESCENCE AND OUR FLAG

By RUTH H. WENTWORTH
135 Maine Ave., Portland, Me.

What is more glorious than our American Flag. And what is more mystifying and beautiful than fluorescent minerals? And what could be more magnificent than our Flag in fluorescent colors? Mr. Edward H. Leonard of 356 Woodfords St., Portland, Maine, has such a flag.

Mr. Leonard has lived in Portland for 57 years of his long life and is well known to many mineralogists. In 1928, searching for a new hobby, at the invitation of the late Herbert M. W. Haven, he joined the new Maine Mineralogical and Geological Society. Immediately, he became absorbed in studying and collecting minerals. He exchanged extensively in the United States, Europe and Africa. He built a fine general collection much of which is irreplaceable now. He has specialized in copper, Paterson, N. J. zeolites, and fluorescents. He has two old books, written by Richard Kirwan, London, England, 1794, Vol 1, "Earth and Stones;" and Vol. 2, "Salts, Inflammable & Metallic Substances," which he treasures very highly. At present he owns from 8,000 to 10,000 specimens.

In 1935 fluorescence was just coming into the spot light. Very few minerals were listed so Mr. Leonard purchased an argon bulb and started experimenting with his own minerals. He discovered several good ones.

Next appeared the iron arc light which was competent but too noisy and flashed or sparked too often. Later there was a germicide gas bulb which excited a good but weak fluorescence. Then came the nickel light which Mr. Leonard saw demonstrated at Yale University. This was not popular either.

A few years ago, Mr. Leonard purchased two of the now favorite Black Lights. Minerals fluoresce much more vividly with these. Four years ago he bought a Mineralight R-51. This brings out gorgeous colors and is perfect for all short wave minerals. And for the long wave fluorescence he has a Shannon Lamp, Model 90.

His cabinet consists of a row of shelves built like stairs, each stair being 4¼ inches high and 2½ inches deep. The cabinet is 3 ft. high, 3 ft. wide and 18 inches deep. It is painted black for better reflection and sets on a chest of drawers also used for minerals. In the top is the germicide lamp, on each side is a black lamp, and in front on a pull-out shelf the Mineralight and Long Wave lamps are placed.

The four short wave lamps together excite marvelous beauty. One large specimen: calcite, willemite and franklinite from Franklin, N. J., glowed as if it were a piece of rose-red velvet, with figures of green and black. With the short wave lamp off, and the long wave on, a very different effect was produced. Minerals that stand out with one lamp fade with the other and visa versa. With both wave lamps on at once still another effect was created. One piece of radiated white willemite not only fluoresced but phosphoresced for about 4 hours after being exposed to the lamp. Two or three words can be read by it before it fades.

Short Wave

Calcite ..... Red ..... Franklin, N. J.
Wernerite ..... Yellow
Brown Zircon ..... Orange
Willemite ..... Green
Scheelite ..... Blue
Powellite ..... White & Cream

Long Wave

Bustamite ..... Red to salmon to yellow
Wernerite ..... Yellow
Hackmanite ..... Orange
Tremolite ..... Orange to sal. pink
Autunite ..... Brilliant green
Fluorite ..... Blue ..... Slope Mt., N.H.
Fluorite ..... White ..... Kentucky

Among the common articles that fluoresce are: cheap green glass from Woolworth's, old white light bulbs, some slag, wood from the common sumach bearing the red fruit drupes in the fall, false teeth, some buttons and cloth.

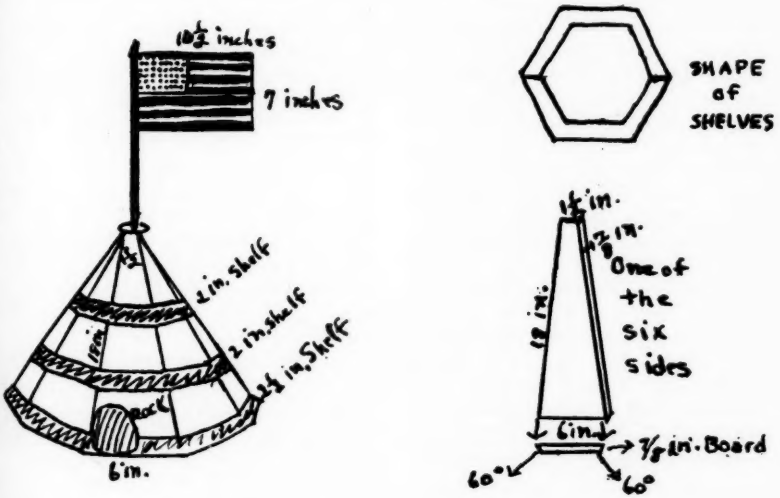
Having had a glimpse of the wonderful minerals from Franklin, N. J., Mr.

Not content with his fluorescent cabinet, Mr. Leonard decided that he would construct a replica of the scene of the flag raising at Iwo Jima. First came the hexagonal column of wood with the top narrower than the bottom. Each of the six sides measured 6 in. at the bottom and 1½ in. at the top and was 18 in. long. He nailed these solidly together and placed a circle of wood 3 in. in diameter on the top with a hole in the center for holding the flag. Then he sawed 3 hexagonal shelves: one to fit around the bottom of the column, this being 2½ in. wide, and two more to fit, one 6 in. up and the other 12 in., up on the column. He fastened the bottom shelf solidly but left the other two loose so that he can remove them when taking it about for display. Over the whole column he places a black cloth and arranges fluorescent minerals tastefully.

For the flag he cut a heavy piece of cardboard about 10½ in. by 7 in. He made a slit in the dowel (with a little knob at the top for looks) for the flag to be nailed into.

Then came the real difficulty, finding minerals that would fluoresce red, white, and blue. After writing to numerous dealers, Leonard and fellow hobbyists, in 1939, decided to see the mine itself. They encountered numerous difficulties but finally obtained permission from the office to enter the mine. Being a keen and studious man, Mr. Leonard with two companions went on another trip to Franklin, N. J., this time determined to see the glories of this place by night. They took with them, a Mineralight, a long wave light, and 1000 ft. of cable. They arranged with the owner of a nearby garage to use his power.

About 1 A. M. this trio could have been seen wending their way to the garage where they connected their lights and went in search of adventure. A more wonderful sight will never be seen. As fast as they walked, the ground beneath them changed to red hot coals of fire intermingled with spots of green, black and blue. Boulders on all sides gleamed as though afire. Whole freight cars showed ruddy lights. The lamps excited fluorescence for about 20 ft. in advance. The quarry was as large as two city blocks. I do not know how long they remained there but Mr. Leonard will always be able to recall vividly that haunting, mystifying scene.



Sketch showing the construction of the fluorescent flag.

ers in the United States he found fluorite from Kentucky that fluoresced white, fluorite from Slope Mt., N. H., that fluoresced blue, both under the long wave lamp and calcite from Franklin, N. J., that fluoresced red under the short wave lamp. He then powdered the minerals finely. For a guide when gluing the powders on, without mixing the colors and leaving clear lines, he placed adhesive tape the width of the stripes on the stripe below the one he was gluing. As soon as that was done, he removed the tape and put it on the next stripe below until it was completed. He tried several types of glue but was not entirely satisfied as the glue fluoresced some. For the stars he stuck 48 small pieces of the Kentucky fluorite over the square of fluorite from N. H. Then he fastened the flag into the staff, arranged the minerals on the column and focused the long and short wave lamps on the whole display. He had accomplished a miracle, a work of art, something to *be* proud of. Once seen, this flag will never be forgotten.

Still not content, Mr. Leonard is planning to make a better flag with canvas and a calcite from Hollywood that will fluoresce red under the long wave lamp. There is still much to discover in this field and I am sure that in the near future, Mr. Leonard will have something more that will satisfy that thirst for knowledge, and yearning for beauty, that is in us all.

TEKTITE OCCURRENCE IN AUSTRALIA

By H. H. BATCHELOR
c/o Post Office, Hughenden, Queens., Australia

Hughenden, in northern Queensland, Australia, is only a frontier town on the banks of the sandy Flinders River, 3 stores, 5 hotels. It is the jumping off place for the best mineral belt of the north and cattle country.

I found the tektites about 12 miles northwest of Hughenden purely by accident. I was hunting at the time (25 years ago). The weather being very hot, I stopped at a lovely shady Sandalwood tree to rest for awhile and to eat some of the small black fruit the tree was covered in. I sat down for awhile to rest, my eyes roving around beyond the shade of the tree. I caught a dark blue flash near a stone in the sunlight and picked up what I thought was a dark blue corundum but soon saw it wasn't. Then more stones were found. They were scattered over a small area (on the side of a low hill) amongst other pebbles and boulders just as though they had been strewn around by hand. Beyond this small area, I never could find even a fragment.

I have just returned from prospecting for coal in the vicinity where I found the tektites 25 years ago. I had found only about 100 fragments scattered over about ¼ an acre and no more though I returned time after time. I had been working on a seam of coal nearby and for a change one afternoon I returned to my tektite find and searched the surface without result until I rooted out a dead tree stump with my pick and unearthed a beautiful blue tektite and several others green and speckled. I have now prospected the ground during 3 months and had to carry water a long way until 2 months ago (last April) when some rain fell. Undoubtedly I am on the spot where the meteorite struck and buried itself, perhaps at a great depth. I have about 3,000 carats of the tektites, ranging from 1 carat up to 30 or 40 carats — 80% of the fragments are sage green and the rest blues and bluish greens. Tektites of these colors and of gem quality have never been found before, as far as I know, and unlike my find are of a dirty brown color and useless.

Polishing Tektites

Polish tektites the same as jade. A tektite is perhaps slightly harder than jade but it takes a finer mirror-like polish.

Editor's Note: A tektite is a glass assumed to be of meteoric origin.

PART OF THE HISTORY OF MINERAL COLLECTING AROUND PATERSON, N. J.

By W. H. HAYES
35 — 22nd Street, Irvington 11, N. J.

Paterson, N. J.: known all over the world among mineralogists and collectors for the many varieties of fine minerals that have been found in its environs.

The writer recently had a visit with one of the vicinity's collectors, whose collecting covers a period of about forty-five years, Mr. John Obert of Paterson, and a resident there since his boyhood. In recalling his early days when he was taken out into the mineralized localities by his father, he told me of the trips he made, the specimens he collected and the varieties of minerals that have come into his hands, as well as the experiences that were outstanding in his memory.

On one occasion, by following up the clues, he observed in the rock formation, and by applying the knowledge gained by the study of it, he opened a pocket which proved to be approximately 5 ft. wide and 4 feet deep. Were there minerals in it? Well, a description of those found within it will be a good start to the story of the different species that were obtained at different times.

Upon working the first opening of the pocket the first mineral that came to view was gray and pale green prehnite deposited on and in vesicular altered basalt, and what was apparently a later deposit, out of solution, of white thaumasite some of which was composed of aggregates of acicular crystals. A little deeper in the pocket, on the "floor" of same, was a mass of disintegrated thaumasite that had embedded in it "floats" (or loose pieces) of both prehnite and harder thaumasite as well as "floats" of groups of strontianocalcite crystals. These were well crystallized but slightly stained brown. Later on, there were found the same crystals on basalt matrix. The strontianocalcite crystals fluoresce a bright milky white under a long wave ultraviolet light.

Going farther into the cavity there was disclosed a more solid matrix upon one surface of which were balls of prehnite of a beautiful shade of green with coatings of laumontite crystals, pure white, and very clean. While the work on the "floor" of the pocket was going on there were chunks of pure white thaumasite falling from the "ceiling", and some of these were 4x4 inches in size. They were found to be coming down from a passage in one corner of the "ceiling" where a separate cavity branched off at an inclined angle. As is usual with thaumasite it was fragile and easily spoiled by rough handling. There might have been an estimated 15 lbs. of this mineral. Thaumasite of quite compact texture and sub-translucent pale green was also noted.

The prehnite in the back of the cavity was particularly interesting because of its ball formation, its three shades of green color on a single piece, its coatings of laumontite crystals, the clear crystals of calcite, and the intimate association of pectolite and thaumasite on the prehnite. Large slabs of basalt were taken out covered with prehnite and calcite. A few aggregates of chalcopyrite mixed with thaumasite on prehnite and a little diabantite were also brought to light.

One specimen brought out was a dome shaped one, as if it had originally been natrolite, but now is made up principally of drusy datolite and prehnite. Through the dome there is a distinct crystal cavity of prehnite after glauberite, while on the crest of the dome there is a knob of prehnite topped by a single crystal that is nearly a perfect cube.

In these days when ultra-violet lamps are available and practical too there is always the possibility of color phenomena in any mineral deposit and it was easily demonstrated here. Some of the parts of the thaumasite fluoresce white, others a light blue, and one prehnite "cast" that is stained light brown fluoresces a bright orange color. Still other specimens fluoresce pink, while the final act is in the showing of phosphoresence in white and pale green.

This was truly a wonderful find, and the thrill of such an event is never forgotten.

NOTES ON THE ECTON MINE, MONTGOMERY CO., PENNA.

By ARTHUR J. BOUCOT
Harvard University, Cambridge, Mass.

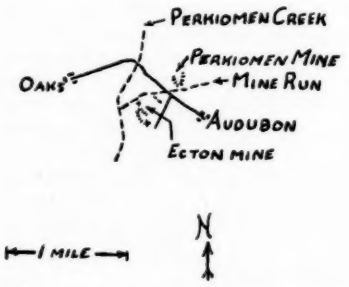
Location

The Ecton Mine is located in southeastern Pennsylvania on Mine Run, Lower Providence Township, Montgomery County, roughly three-quarters of a mile east of the town of Oaks in Upper Providence Township. The mine's geographic coordinates are 40-07½N, 75-27W.

General Geology

The mine workings are in the red shales and arkoses of the Upper Triassic Stockton formation. During the spring of 1948 the Bureau of Mines drilled several boreholes one-half mile to the northeast near the dumps of the Perkiomen Mine. The cores from these drillings indicate that the Triassic sediments here have a thickness of roughly four hundred feet, and rest on lower Paleozoic argillaceous limestones.

The ore body, as far as could be determined, is located within the shattered zone of a gravity fault. This fault cuts the Triassic sediments which form the wall rock of the mine, and presumably parts of the underlying Paleozoic limestone as well. The fault strikes roughly N35°E and as observed in the southwest adit, it dips about 75°N. Where it is observed in the workings, the fault zone is about twenty feet thick. It consists of gray fault gouge clays, horses of red Triassic sediments, breccias of shale, arkose, and limestone, and irregular veins of vuggy quartz. The hanging wall in the southwestern adit is heavily grooved by near-vertical striae and polished by slickensides, indicating that the final movements along the fault were of the nature of a dip slip fault.



DATA TAKEN FROM NORRISTOWN SHEET

No estimate of the net slip could be made, but its magnitude is probably similar to the fault of the nearby Wheatley Mine. Rogers[1] gives data which can be recalculated to give the following information concerning the movement along the gravity fault on which the Wheatley Mine is located:

a—fault strikes N33°E and is vertical
b—net slip is twenty feet
c—net slip pitches 45°SSW
d—relative movement is to the SSW and the SE block has gone down relative to the NW block

Mine Workings

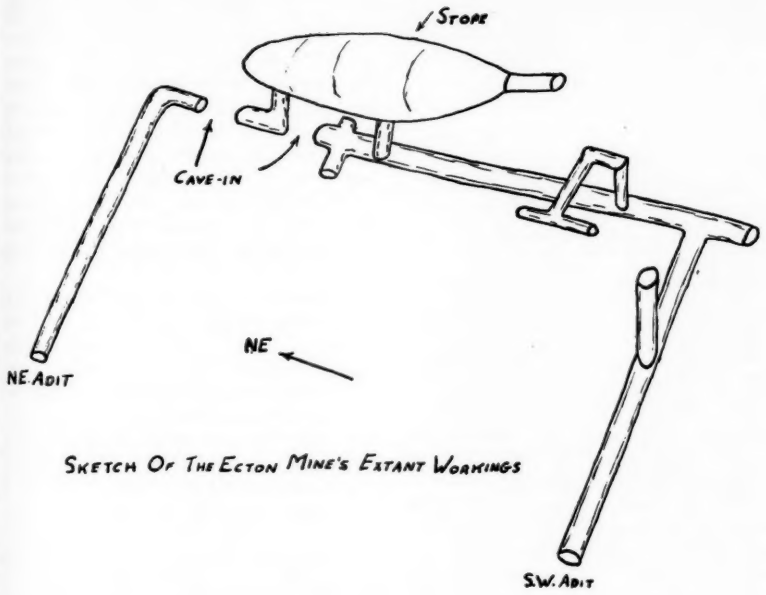
The Ecton Mine has been abandoned for roughly one hundred years; the last reference to its activity being made in 1853.[2] Much of the roof has caved in, and nearly all the timber is thoroughly rotten and in a very unsafe condition.

Though only a few remnants of the actual workings are still extant, the large and extensive dumps, now overgrown by large trees, suggest that during its active period the mine was fairly productive. Originally the mine had a shaft on the hill overlooking Mine Run, but this has long since caved in. Clustered about it are the massive remains of old foundations, doubtless part of the buildings which served the mine in various capacities.

About six feet above the present level of Mine Run are two adits, which are still open and accessible. The northeasternmost adit, driven southeastward, has very little head room and had filled with about three feet of water. To the SE it intersects a southwesterly trending

[1] Rogers, H. O., *The Geology of Pennsylvania*, Vol. II, Part II, 1858. p. 703.

[2] Miller, B. L., *Lead and Zinc Ores of Pennsylvania*, Pennsylvania Geological Survey, Fourth Series, Bulletin M5, 1924. p. 36.



SKETCH OF THE ECTON MINE'S EXTANT WORKINGS

drift, which is caved thirty feet from the adit.

The southwestern adit runs into the hill about one hundred feet before it meets an inclined raise which goes up the face of the hanging wall of the fault. This raise was followed by means of a ladder for about thirty feet; no other passages were seen connecting with it. The timbering here is in a highly rotten state. The adit penetrates about another ten feet or so before running into a drift at right angles. This drift runs about twenty feet to the southwest and ends blindly, but to the northeast it runs about seventy feet, finally intersecting a stope. A raise and several short cross-cuts run off from this drift. The raise runs vertically for about twenty feet until it intersects a ten foot northwest trending cross-cut, the cross-cut in turn intersecting another drift. This last drift extends for over twenty feet both to the northeast and southwest, but it is difficult to traverse. Much gossan is present here, but nothing more than mineral specimens as far as ore is concerned.

The entrance to the stope is wide enough to admit a small person, with considerable wriggling, and is situated on the roof of the lowest drift. The stoped-out area measures roughly 50'x20'x20', and is lenticular in shape. A short winze was cut at the northeast end of the stope, which presumably connects with the drift to the northeast, but this connection has been obliterated by a cave-in. At the southwest end of the stope there is another drift which was followed for about twenty feet. This stope still contains large masses of galena and sphalerite, on the surfaces of which one can find many interesting oxidized products.

Mineralogy

The irregular and lenticular veins of quartz are host to a variety of hypogene minerals, presumably of hydrothermal origin and genetically connected with the igneous activity consequent upon the intrusion of bodies of diabase in this portion of the Piedmont.

In the stope visited, the ore seems to be made up mostly of argentiferous

galena, sphalerite, and smaller amounts of chalcopyrite. Early reports from this district indicate that such oxidized minerals as pyromorphite and anglesite were often present in sufficient quantity to be utilized as ore.

The hypogene minerals in the hydrothermal veins, seem to be as follows: phantom quartz, dolomite, barite, galena, sphalerite, pyrite, and chalcopyrite. Benge and Wherry[3] reported also fluorite, ankerite, arsenopyrite, and hematite.

The supergene minerals are anglesite, sulfur, linarite, limonite, smithsonite, hemimorphite, herrengrundite or a mineral quite similar to it, cerussite, malachite, azurite, pyromorphite, wulfenite, chrysocolla, covellite, chalcocite, and chalcedony. Benge and Wherry[4] reported bornite, marcasite, copper, cuprite, hydrozincite, and pseudomalachite.

It is in the irregular bodies of vuggy quartz with attendant sulfides that there occurs a very interesting association of supergene minerals. It seems probable that the workings never penetrated the permanent water table to any great extent, thus enabling the processes of oxidation, and supergene enrichment to have affected the ores. The mine workings themselves have provided further access to oxygenated ground waters percolating down along the fault zone and thus have further hastened the processes of oxidation.

The oxidized minerals in the stope may be divided into two major groups: those immediately adjacent to decomposing sulfides and therefore formed in a very acidic environment, and those more distant from the sulfides and consequently located in a less acid environment. The degree of acidity, i.e., proximity to decomposing primary sulfides, seems to be the controlling factor in the determination of which minerals are formed by the oxidation of the sulfide minerals in the open stope and adjacent openings. An abundant supply of air and water is present, with which the sulfides are broken down into insoluble sulfates and acidic solutions.

There seems to be a lowering of the acidity after all the sulfides in the area have been leached away, and a different suite of minerals is present. The sulfates are altered to carbonates, phosphates, silicates, and molybdates which seem to be more stable under these new conditions than are the sulfates. The probable source of the phosphate in this area is not fully understood, but it seems likely that some of it may come from the ground waters working in the adjacent Triassic sediments.

The first supergene mineral to form from the hypogene sulfides is anglesite in small sharp crystals, indicating that galena under existing conditions is less stable than the chalcopyrite. Following the anglesite, as determined by the superposition of various minerals growing on top of one another, are the complex sulfates linarite and a mineral similar to herrengrundite, if not identical to it. These three minerals for the most part constitute the direct alternation products of the galena and chalcopyrite and may be observed in the process of formation today.

Both laterally and vertically away from the galena and chalcopyrite with their blue-green scum of sulfates is a quartz gossan which contains the second group of minerals. These minerals are malachite, cerussite, pyromorphite, azurite, and wulfenite. Some of the copper is also present as chrysocolla.

The sphalerite in the stope alters directly to smithsonite, some of which is stained green by small amounts of copper, and this material is changed to hemimorphite in the gossans.

All the pyrite in this deposit has been altered to limonite. It is probably largely due to the acid produced by the oxidation of the abundant pyrite that caused the formation of the sulfates.

Anglesite occurs in small white crystals encrusting galena.

A few microscopic crystals of sulfur are observed in the oxidized galena along with some anglesite, indicating that the oxidation of the galena must have stopped momentarily, rather than proceeding completely to sulfate.

Linarite occurs in minute royal-blue

[3] Benge & Wherry, *Mineral Collector*, Volume XIII, 1906. p. 43.
[4] *Ibid.*

crystals, much resembling azurite in color. It may be easily distinguished by its prominent cleavage parallel to the basal pinacoid, and by the fact that hydrochloric acid will cause its surface to be coated with lead chloride, with none of the bubbles of CO_2 that would be expected with a carbonate. Its refractive indices were determined by the immersion method and agree with the values given in Larsen and Berman.[5]

The rare sulfate herrengrundite, or a mineral quite similar to it, occurs as coatings of minute acicular crystals on anglesite or galena. The mineral has a robin's egg color similar to aurichalcite. The optic properties are almost identical with those of the type material, and X-ray powder photographs indicate that it is structurally quite close to the type mineral. The slight differences are probably to be construed as different cell dimensions, perhaps induced by a slightly different composition.

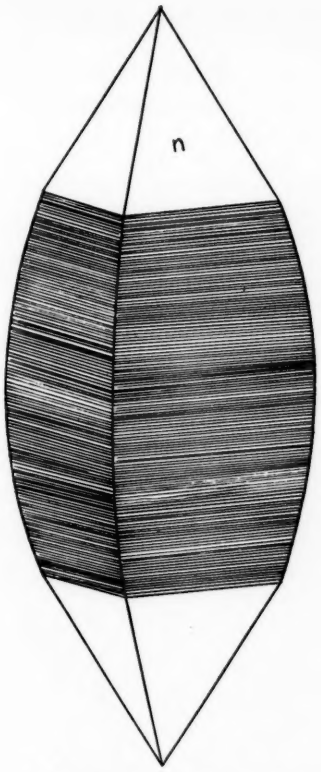
Cerussite is abundant in the quartz gossan as small, white, twinned crystals, and has a habit similar to the cerussite from Phoenixville, Pennsylvania. One specimen of cerussite was observed to be partially altered to pyromorphite. Malachite occurs in small bundles of radiating fibres, which are frequently associated with minute crystals of azurite.

Pyromorphite occurs as crusts of minute green crystals, and as small barrel-shaped crystals. One specimen was observed in which the pyromorphite is a reddish-brown, due to inclusions of mud.

Wulfenite is rare, occurring as minute pyramidal orange crystals implanted on pyromorphite. It occurs in steep pyramids rather than in the more common tabular habit. The wulfenite from the nearby Phoenixville area has a bright red color and a tabular habit. The only form observed at the Ecton Mine was [111].

Chrysocolla occurs as irregular replacements of malachite and the other copper minerals. It often has the appearance of a bit of gelatin which has dried and cracked.

[5] Larsen, E. S. & Berman, Harry, *U. S. Geological Survey Bulletin 848*, 1934. p. 202



Wulfenite from the Ecton Mine

Calcite At Bound Brook, N. J.

On the far right hand side of the New Jersey Quarry Corp.'s trap rock quarry at Bound Brook, N. J., a vein of pale yellow crystallized calcite has been opened this summer by the blasting. This calcite fluoresces a greenish-yellow, and purple-blue under the Mineralite, but is not so pretty as under Purple-X, and a red at the base of the crystals under the Purple-X lamp. It also phosphoresces for about half a minute.

This quarry is one of the largest in the world, and permission must be obtained to look for copper or calcite. Four dogs are kept in the quarry with freedom to run around and greet trespassers. The superintendent is Walter Henderson.—T. O. L.

THE GILLETTE QUARRY, HADDAM NECK, CONNECTICUT

By HELEN STOBBE

Dept. of Geology, Smith College, Northampton, Mass.

INTRODUCTION

The Gillette Quarry, Haddam Neck, Connecticut. (Fig. 1) is one of the best known pegmatite localities. Members of the Queens Mineral Club had a Sunday collecting trip to the area in June 1947, and at the invitation of Mr. and Mrs. Curt Segeler I joined the group to give a short talk on pegmatites. References to Haddam Neck are few and scattered in the literature. Therefore it may help collectors to have a short article which brings these together with the remarks of my talk. Mr. Sterling C. Gillette, the present owner, lives on the property, and is always glad to see mineralogists. I wish to thank him for our conversation that Sunday, and for some of the information contained in the paragraph on the history of the quarry. Dr. E. N. Cameron of the U. S. Geological Survey, and now a member of the Department of Geology, University of Wisconsin, has kindly read the manuscript, and I wish to thank him for suggestions and the material he put at my disposal to include in this article.

Although members of the Queens Mineral Club found only ordinary pegmatite minerals, Haddam Neck always merits a visit because of its historical interest, its typical pegmatite minerals, and the quarry exposures which show the geological relationship of the pegmatite to the country rock.

HISTORY

The quarry was opened in 1899 for the purpose of mining feldspar, and this mineral has been its chief production. At that time it was owned by Mr. M. P. Gillette, father of the present owner. From the beginning it yielded a variety of valuable minerals, but its tourmalines and beryls made the locality world-famous. Specimens of the beautiful green and pink "watermelon" tourmalines are now in museums as for example Wesleyan University, and some of the polished and cut gem stones are in the Morgan Collection at the American Museum of Natural History, New York City. Mr. Gillette (1937, p. 333) says that colored tourmalines were little known and found only at Paris, Maine, until they were discovered in considerable quantity at Haddam Neck. Such colors as green, blue, red, pink and yellow were found. The tourmaline crystals occurred lining cavities in the pegmatite, and some pockets yielded as many as 600 crystals which ranged from the size of a needle to that of a pencil or larger. At first the tourmalines were sold to dealers and collectors, then later exclusively to a dealer who operated the quarry for several years under a royalty lease with the owner.

Beryl was also found in abundance, particularly green beryl and aquamarine; but the quarry had yielded only ten large crystals of rose beryl (morganite). It was reported at the time of our visit in 1947, that a supply of rose beryl found a few years earlier had been exhausted by collectors. Cameron (personal communication) says "Some crystals of rose beryl with green centers ("watermelon beryl") were found during wartime operation. Some of these crystals were very beautiful. A rose beryl crystal presented to me by one of the operators is a doubly terminated prism with the edges of the basal pinacoids truncated by pyramid faces. The crystal measures 2½ inches in height and 2 inches in diameter. Considerably larger crystals were shown to me from time to time by the operators."

By 1937 the quarry had been abandoned; but with the need for strategic minerals which World War II created, the mine was worked for mica from November, 1942, to November, 1944, by private operators under a leasing arrangement with the owner.

"In November, 1942, the mine was mapped and studied for the U. S. Geological Survey by Dr. E. N. Cameron and periodic examinations were made by Dr. Cameron and Mr. V. E. Shainin in 1943 and 1944. In June, 1945, the mine workings were remapped by Mr. Shainin and Mr. F. H. Main. Copies of these

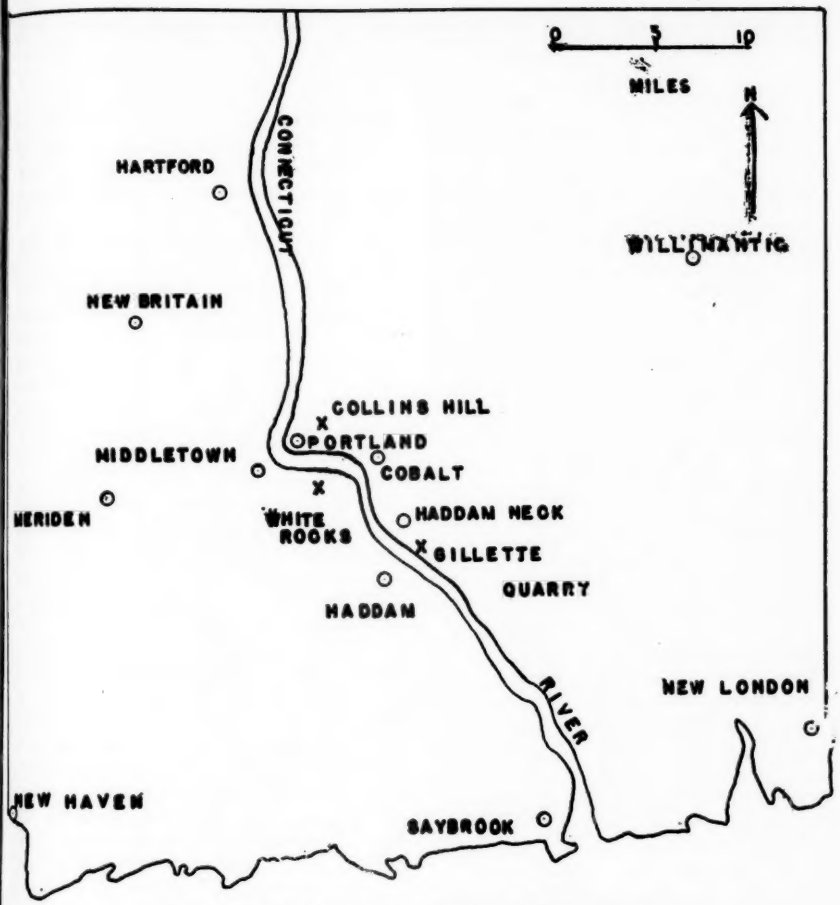


Figure 1—Index Map showing location of Gillette Quarry.

maps are on open file at the office of the director of the Connecticut Geological and Natural History Survey, Trinity College, Hartford, and may be inspected by anyone interested in the quarry." (1)

LOCATION

Gillette Quarry is located on the east side of the Connecticut River opposite Haddam, about 20 miles from the mouth of the river (Fig. 1). Situated in a scenic section of south central Connecticut, it offers an ideal day's collecting trip for mineral enthusiasts who live near New York City or in Connecticut or Massachusetts. Directions to reach the quarry follow. At Middletown cross the Middletown-Portland Bridge, and take route 15 and 6A. After crossing the railroad tracks reckon mileage thus:

0.0	end of R. R. tracks
4.6	from R. R. tracks turn right on route 151 continue 3.5 miles.
8.1	turn right to Haddam Neck and continue 1.7 miles
9.8	turn left downhill and continue 1 mile
10.8	Gillette house on right of road

(1)—Cameron, E. N.: Personal Communication.

The quarry is behind the house near the river.

GEOLOGY

The rocks associated with the Haddam Neck pegmatite are schists and gneisses (Fig. 2). The pegmatite occurs as knobs, irregular masses and dikes in the *Bolton schist,* a quartz mica schist where exposed in the vicinity of the quarry. Adjoining the Bolton schist on the east in this section, is the *Monson granite gneiss,* which is a light and dark colored, banded rock composed of orthoclase, plagioclase, quartz, garnet, biotite and sometimes hornblende. East of the Monson gneiss is the *Hebron gneiss* which varies from a granitic gneiss to a schist. Associated with the Bolton schist north of Haddam Neck are the Maromas gneiss and Glastonbury gneiss. The *Maromas granite gneiss* is a medium to fine grain biotite gneiss, the color of which varies with the amount of biotite present. The *Glastonbury* gneiss is a dark, well banded, almost schistose rock composed essentially of quartz, feldspar, biotite, hornblende and epidote. In the Haddam Neck area, the Bolton schist is bordered on the west by the *Haddam granite gneiss.* This is a light colored, rather fine grained, granitic aggregate of quartz, feldspar, biotite and sometimes hornblende and garnet. The scattered, small biotite flakes give an indistinct foliation or banding to the rock. West of the Haddam gneiss are respectively the Middletown gneiss, Bolton schist and Newark Series. Although the *Middletown* gneiss consists of a variety of rocks, it is dominantly a light gray-greenish, thinly laminated hornblende gneiss. The *Newark series* (Upper Triassic) consist of a thick series of sediments which are chiefly coarse to fine grain red sandstones but which also contain beds of conglomerates and shales.

Foye (1922, p. 6) says "pegmatite dikes occur within the gneisses, as well as within the schists — yet the important mineral localities are confined almost exclusively to the narrow band of schist surrounding the Glastonbury gneiss and lying between the Monson, Maromas and Haddam gneisses." It would appear that the pneumatolytic (gaseous) fluids were squeezed out of the granites, and collected in the tightly folded sediments within the zone of contact metamorphism." Furthermore, Cameron and Shainin (1947, p. 353-354) have found that the pegmatites in the Middletown district occur principally in the Bolton schist and the Monson gneiss.

In describing the geological relationships of the Haddam Neck pegmatite Cameron (personal communication) says "I imagine that owing to growth of vegetation in the workings and owing to the large amounts of debris which were left on the floor, the shape and the structure of the pegmatite is now somewhat obscure. In our report we described it as a complex pegmatite body consisting chiefly of steeply dipping interconnected sheets. The sheets strike N. to N. 35° W. and are exposed for a strike length of at least 330 feet. They range from 15 to 80 feet in thickness. The walls are highly irregular in places but in general dip steeply west to steeply east. Muscovite was mined largely from a layer one-half to six feet feet thick forming the outer shell of the pegmatite body along most of its contacts with the wall rocks. This layer or wall zone was particularly well developed along the west wall of the main part of the open cut. It consists chiefly of quartz and plagioclase with subordinate perthite and accessory green apatite and black tourmaline. In this zone books of muscovite an inch to 1½ feet broad and as much as 8 inches thick were found. An interesting feature of many of the books was the presence of inclusions of tourmaline, some black or dark green, some light green, flat crystals that in certain books were arranged in delicate rosettes or fans nearly parallel to the cleavage of the mica. In the main part of the open cut during the later stages of mining, another layer containing large muscovite books was found near the middle of the pegmatite. Some books and flakes were found throughout the pegmatite body."

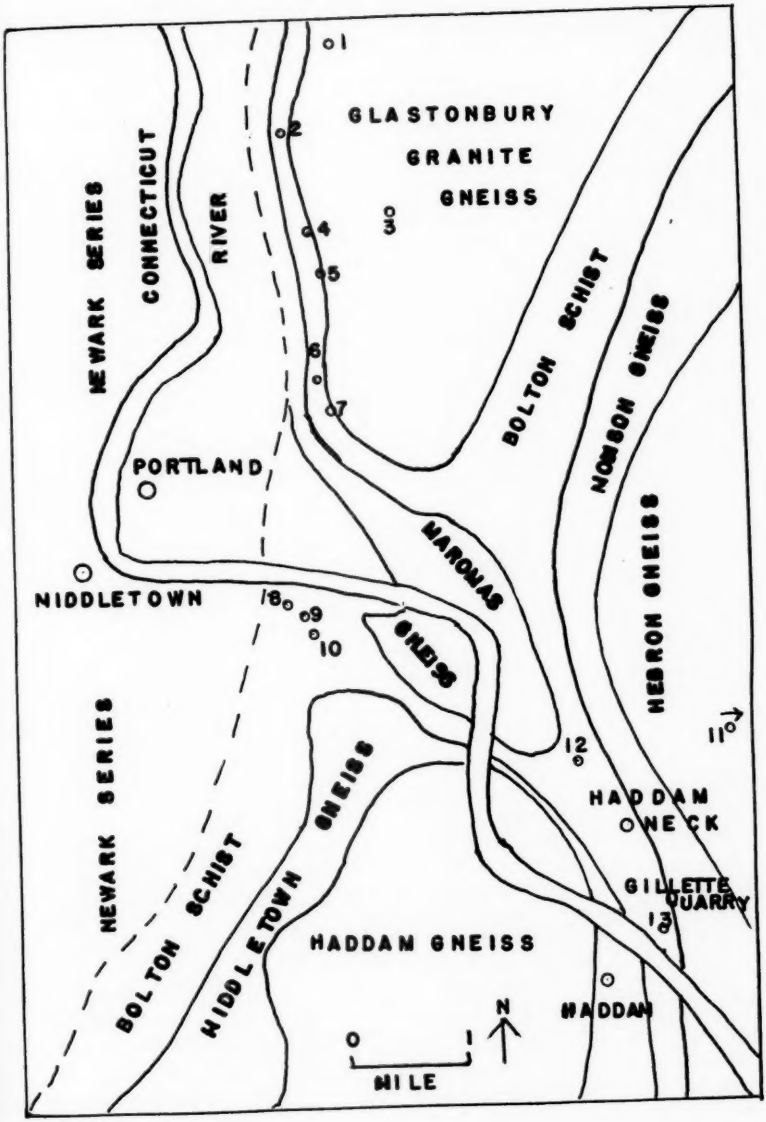


Figure 2—A generalized geologic map of Haddam Neck and vicinity.

MINERALOGY

Connecticut pegmatites have yielded more minerals than any other type of mineral deposit in the State (Schairer, 1931, p. 99), with a list of at least 96 minerals reported. Connecticut also, for some years, lead all states in the tonnage of feldspar produced.

The following minerals have been reported from the Gillette Quarry: albite, apatite, beryl, biotite, cleavelandite, columbite (Fe, Mn), Cb_2O_6), cookeite (hydrous lithia mica), fluorite, kunzite (lavender spodumene, $LiAlSi_2O_6$), lepidolite (lithia mica), manganapatite, microlite ($CaTa_2O_7$), muscovite, orthoclase, microcline, perthite, quartz, torbernite (copper uranite), tourmaline and uraninite.

The minerals collected on the Sunday excursion will be listed and briefly described.

Albite. (Soda feldspar)

Several varities were found.

1. Small, clear crystals (1-2 mm.) lining cavities between blades of cleavelandite. Prism and pinacoid faces developed.
2. Fine-grained, sugary white albite.
3. White, bladed cleavelandite.
4. Stringers in microcline perthite.

Apatite. Green crystals (1 cm. diam.) of manganapatite associated with albite and quartz.

Beryl. Pale green-blue opaque, hexagonal crystals (¾" diam.).

Lepidolite. Small, lavender, micaceous flakes and crystals (1-4 mm. diam.).

Muscovite. Greenish - yellowish - white crystals which have grown in clumps or groups. Found notably as a selvedge or edge between the pegmatite and its wall rock.

Perthite. All of the feldspar found was either albite or white microcline perthite.

(1) Masses of perthite with microcline (potash feldspar) as the host rock and irregular stringers or blebs of albite.

(2) Good crystals (2" in size) with well developed prism, basal and orthopinacoid faces. Some of this mineral was crushed for fragment study with a polarizing microscope, and found to be microcline perthite.

Quartz. (1) Smoky quartz intergrown with feldspar.

(2) Small colorless crystals lining vugs.

Tourmaline. Black irregular masses and trigonal crystals.

OTHER PEGMATITE LOCALITIES

A few additional localities will be mentioned here, because of the interest in pegmatites and the variety of minerals which they offer collectors. Some references are given at the end of the article.

As early as 1819 tourmaline was reported from Haddam, on the west bank of the river opposite Haddam Neck (Webster, 1819, p. 239). Foye (1922, p. 5) gives the location on a map of the mineral localities in the vicinity of Middletown. Best known of these Connecticut pegmatites is Strickland Quarry, Portland, on the side of Collins Hill (Figs. 1 and 2). Some of the members of the Queens Mineral Club stopped at White Rocks (Rice and Foye, 1927, p. 79-82), southeast of Middletown (Fig. 1 and 2), on the way home from Haddam Neck, and added to the minerals already collected garnet dodecahedrons and green tourmalines with the cores a deeper shade than the outer zones. Pegmatites in the Middletown district (Fig. 2), an area about 14 miles long and 9 miles wide east of Middletown, were among about 120 pegmatites examined for beryl and other minerals in 1942-44 (Cameron and Shainin, 1947, p. 353-354). Branchville, in the southwestern part of the state, should be mentioned, especially because of the recent work on the origin of the pegmatites by Shainin (1946, p. 329-345). New England has many pegmatites. Best known, perhaps, are Paris, Newry and Black Mountain, Maine. The Ruggles Mine, 1½ miles northwest of Grafton Center, New Hampshire, has yielded rare phosphates and uraninite, autunite and gummite.

Among other states which have famous pegmatite deposits are North Carolina, Texas, New Mexico, South Dakota and California. In New Mexico productive mica deposits lie in the vicinity of Santa Fe and Taos (Jahns, 1946). South Da-

kota has the unique Etta Mine with the enormous crystals of spodumene (47 feet long), as well as other quarries as the Bob Ingersoll and Peerless. Furthermore, the Custer region in the southern part of the Hills, has yielded minerals commercially important. California (Pala, San Diego County) has produced the beautiful pink tourmalines (rubellite), often in radiating clusters, now found in many museums throughout the world. Among the foreign localities, Oslo (Christiana) district, Norway and Namaqualand, South Africa, may be mentioned.

ORIGIN

Pegmatites by definition are coarse, irregular grained rocks, for the term "pegma" means frame or net work from the Greek. They are associated with igneous rocks, usually granite but syenite, diorite and gabbro pegmatites do occur. This discussion will be confined to granite pegmatites. These carry the minerals of a granite, and often additional rare minerals. Pegmatites which contain only potash feldspars (orthoclase, microcline, perthite) quartz and muscovite do not interest mineral collectors because of their few and ordinary minerals. Complex pegmatites, however, which contain in addition rare minerals as albite, beryl, spodumene and others are excellent hunting grounds for mineralogists, for as many as 97 minerals have been recorded from this type of pegmatite.

Pegmatites are often found in schists and the granites associated with them. They may bear a cross-cutting vein or dike-like relationship to the granite. It is believed that they have originated from granites because one can trace them into these rocks in the field; and they are later in age because they cut across the granite. Originally, the granite was molten rock (magma) beneath the earth's surface. As the temperature and pressure lessened it began to cool, crystallized and solidified into rock. The earliest minerals to form are represented by those in granites, for example potash feldspars, quartz and muscovite. Some magmas carried additional rare elements. Therefore as their crystallization progressed, the remaining liquid phases became richer in constituents as water, chlorine, fluorine, boron, beryllium and other highly volatile substances — all now found in the rare minerals of pegmatites. The most readily accepted theory today to explain their origin is that of "replacement". This theory proposes that the earlier formed minerals have been replaced by those formed from the later, residual phase of the magma. For example, potash feldspars may be replaced by soda feldspars which in turn may be replaced by lithium minerals, and so on through the series. Evidence of this replacement lies in remnant cores of the host mineral,and fringes and stringers of a later, invading mineral as albite in microcline. Hess (1925, p. 289), Landes (1925, p. 355; 1928, p. 542) and others have upheld this theory. A chemical explanation has been suggested in the substitution of elements of different ionic radii, for lithium (ionic radius - .78) can replace sodium (ionic radius - .98), and sodium can replace potassium (ionic radius 1.33). It is to be noted that an element must have a smaller ionic radius to effect replacement.

Opinion on the replacement theory, however, is not unanimous. Some people believe that pegmatites contain very little water or other volatile constituents (5-10%), and that their minerals have resulted simply from the separation out or rhythmic fractional crystallization of a granite magma (Shaub, 1940, p. 673).

A great deal has been writen on the origin of pegmatites. Shand (1946, p. 178) gives a brief history of some of the theories which have been held, and an up-to-date review of the subject with many pertinent examples in his chapter "The Genesis of Pegmatite" in the third edition of *Eruptive Rocks*. The subject is a complex one—far more so than the few paragraphs of the last section of this article suggest. It is not yet solved but a live subject open for future work and discussion.

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HUGE PETRIFIED TREE FOUND IN SOUTH DAKOTA

Reprinted from **MUSEUM NEWS**, May, 1949

University of South Dakota, Vermillion, S. D.

Fossil wood is found commonly over most of South Dakota; in fact it occurs over much of the United States. It is evident that where we find petrified wood there existed at one time a forest. And this means ages and ages ago for, while the wood was being changed to stone it was covered with many feet of soil and which was later eroded away leaving the fossil wood exposed.

It is a silica or some like mineral in solution that replaces the cells in the wood and in many instances they show as plainly as in the original wood. Only rarely do we find in South Dakota specimens that are as highly colored as those in the Petrified Forest Preserve in Arizona. The color is due to mineral, as iron and copper in solution at the time the change is taking place. There are six sections of this fossil wood in the Museum and all highly polished.

Some years ago we saw a petrified log in the southern Black Hills which was about eight ft. in length and 20 inches in diameter. In this log, near the top, there shows a beautiful example of a woodpecker hole. We do not know that woodpeckers had developed as early as when this tree grew but we can hardly credit this hole to any other animal This log is standing upright near the Burlington depot in Edgemont today.

Lemmon has a Petrified Wood Park and a whole block is filled with specimens mostly from that region. This is a fine exhibit and attracts many tourists.

The father of all petrified logs is in South Dakota and, as far as known, is not only the largest in the United States but in the whole world. It lies exposed about three miles northwest of Cash, an inland town in north central Perkins County. This log measures 9 feet in diameter at the base and 84 feet in length where it enters a low hill and is entirely covered with earth. On the other side of the small hill there is the top of a petri-

fied tree and on the same level but off line several feet. Further excavation would have to be made to determine the question of whether it is the same tree. If this proves to be part of the same tree it will show a height of 200 ft. Pretty big tree, you will say, to have grown in South Dakota. It must have grown here about the time the 30-ft. dinosaur was wading around in mud in this region for his tracks have been found only a few miles east of here in the same county. As there are no limb scars until near the end of the trunk it would indicate a very tall tree. This tree was probably a giant sequoia as only a few miles south in Perkins County fossil cones of this family have been found and are in the Museum. This species of sequoia is extinct today in the United States but has been found growing in China. This petrified log is crumbling badly and cannot be moved but the land belongs to Perkins County and every effort should be made to protect it from human predators. There are specimens of this log in the Museum.

Opalized wood is also found in South Dakota. This is petrified wood that at time of making the change the pressure was so great that all semblance of cells were crushed out. This is usually of uniform color and is capable of high polish.

A letter dated July 8, 1949, from Mr. W. H. Over, Director of the Museum, gives some additional information on the huge tree.

Editor R&M:

"Answering your inquiry concerning the large petrified log found in Perkins County, South Dakota. There is no question about it being the largest petrified tree in South Dakota, however, it it doubtful if the largest in the world.

"I have visited the log several years ago and the measurements are correct. The main trunk is exposed for about 85 feet where it enters the small hill. I am enclosing a copy of our Museum News and therein you will find the log described.

"Cash is just a country store and Post Office on a dirt road about 30 miles south of Hettinger, North Dakota. The latter is on the St. Paul and Milwaukee Railway. It is about 15 miles northwest of Bision, the County Seat of Perkins County, with no railroad, but is on highway 8 which runs west from Mobridge to Buffalo, the County Seat of Buffalo County and the northwest county of the state.

"The petrified tree is 'off the beaten path" as you will note. The dirt road through Cash hits highway 8 about six miles south of Cash.

"Last May I wrote to a party in Lemmon (east of Hettinger but in Perkins County) for information as to the present status of this log, but no answer, and guess he has passed out.

"The hill should be excavated to learn if the same tree is exposed on the other side. And, it should be fenced for protection, as some day people will be driving long distances to view the log."

Conn. Completing $2,000,000. Road Tunnel

NEW HAVEN, Conn., Aug. 20.—The 1,200-foot twin-bore tunnel through West Rock will be completed about Nov. 1 and opened to traffic as the connecting link in the Wilbur Cross Parkway, G. Albert Hill, State Highway Commissioner announced today. Traffic now has to detour in New Haven around West Rock.

The $2,000,000 tunnel, the first highway tunnel in the state, will give motorists an uninterrupted stretch of four-lane divided highway (the Merritt Parkway plus the Wilbur Cross Parkway) in Connecticut from New York line almost to the border of Massachusetts.

Work on the tunnel was started in March, 1948.

New York *Herald Tribune*
Aug. 20, 1949

THE MICRO-MOUNTER

Conducted by Leo N. Yedlin, 557 W. Penn St., Long Beach, N. Y.

Lou Perloff, of Brooklyn, N. Y., has sent to us a resume of some of his findings in the field of m/m collecting. We think that his letter is really worthwhile, and we submit it here complete.

"A good deal of the pleasure you get from any hobby, be it no more brain-taxing than the collecting of match book covers or cigar bands, derives from the skills or special knowledge you pick up along the way and the pride you take in getting out of the fumbling-amateur class as quickly as possible.

"As applied to the micro-mounter, one of the first bits of knowledge acquired (I'll come to the 'skills' part later.) is never to settle for what the label says, or, there's-more-to-this-than-meets-the-eye. The collector of cabinet specimens, if he finds something himself, will give it a once over, take maybe a squint at it through a hand lens, put it away in its appropriate place and call it a day. If he gets the specimen by swap or purchase the label is usually taken at its face value, depending of course, on who sent it. The careful collector will normally check against a text and whatever other specimens of the same mineral he has, or can examine, make whatever additional notes may be needed on the label, and likewise call it a day.

"For the micro-mounter that's only the starting point. Microscopically, few specimens are ever merely what the label says they are; minerals love company. I can think of scores of pieces acquired for the species on the label, which, broken up, afforded wonderful specimens of up to half a dozen or more other minerals. And I mean top-notch crystallized specimens. I don't make m/ms of massive junk just to add another check mark against a species name in the index of my Dana. One of the additional little ironies is that the mineral on the label quite often turns out to be a dud, but something else shows up that — oh brother! I can think of a pyrargyrite from Zacatecas, Mexico, that turned out to be too dull and bruised to mount, but the larger xls were hollow, and within those hollow xls were perfect, brilliant polybasites better than any I'd ever seen.

"You soon get to recognize the material from certain localities as famous in this respect. Thus I never pass up without a careful check St. Andreasberg calcite, Kapnik quartz, the cellular limonite of the Tintic district, Utah, limestone from Binnenthal, any cavity material from Franklin, N. J., and almost anything from Freiberg or Cornwall.

"Specific instances come to mind at once. In a nondescript piece marked galena in calcite from the Harz I got dyscrasite, bournonite, pyrrhotite, jamesonite and argentite — all in fine micro-xls. One piece of kermesite from Braunsdorf, Saxony, gave me stibnite, valentinite, bismuthinite, stibiconite, and best of all, a beautiful miargyrite. The last named was a perfect illustration of hunting for it 'where it had to be'. A check in Dana's VII edition showed that Braunsdorf was a type locality for miargyrite. So I kept my eye peeled for it as the chips fell. Sure enough, implanted on a cluster of bismuthinite xls was a sharp, lustrous xl, looking exactly like the middle drawing on page 426 of Dana VII.

"I can go on like this for hours. Once I got a jordanite in Binnenthal limestone. The first glance under the 'scope showed it to be a fake. Someone had plugged a bruised twin into a cavity in exactly the way it would occur in that material. A neat job — but still a fake. As a cabinet piece it was worthless. Out came the hammer, and here you have a paradoxical illustration of the fact that a micro-mounter can sometimes be a good samaritan in smashing up supposedly good cabinet material. I wonder through how many trusting hands that lemon passed until it came to its final resting place under my hammer. Well, inside that limestone were jordanites that really belonged there, as well as blood-red rutile, a transparent yellow tetrahedron of sphalerite showing the combination of positive and negative

tetrahedra, and yellow tourmaline in well terminated xls.

"One last illustration: The quartz of Governador Valladares, Brazil. One specimen shows very fine autunite and lepidolite on the surface of a quartz xl in part covered by a thin film of water-clear hyalite. Little spheres of hyalite have formed about individual xls of the two minerals, preserving for all time their wonderful color and perfect crystallization. Another specimen shows the famous helvite-tourmaline combination in clear quartz. This is a specimen one can study for hours. The tourmaline is quite remarkable, ranging from perfect prismatic xls to material so fine that it looks exactly like the sweepings on a barber's floor. One xl has been shattered as if by explosion, and a dozen pieces of the same xl are identifiable, jumbled in a small area in the quartz. In another part of the quartz xl are long tourmalines with a whole string of helvites impaled on them in what would almost seem to be the orderly spacing of a beaded necklace. Most interesting of all are the colorless octahedral xls that accompany the helvite tetrahedra. At first I took them to be fluorite because of their crystallization. But they could just as well be danalite, a member of the helvite group. (Has anyone noted these who can offer a suggestion?)

"All of which is offered as proof that the view is finer on the inside. The stuff on the exposed surface of a specimen is usually worthless, if you're looking for lustrous and unbruised material. You can wash it under all the water that goes over Niagara Falls in a month and you'll still end up with a dud. One of the thrills of micro work is to get hold of, say, a proustite or cuprite with outer surface blackened and corroded, and break into a cavity inside where the xls gleam, blood-red, and often transparent.

"As for the cavity, it need not be 'so deep as a well, nor as wide as a church door; but (where the microscope is there to see) 'tis enough, 'twill serve'. In one tiny blob of clear cerussite from Broken Hill, not more than 1/16 inch in diameter, I have counted at least 30 perfect almandite garnets. Try topping that one!

"So much for the things the micro-mounter sees that the other collectors — no matter how fine their cabinet and museum specimens — can never hope to see with the unaided eye. As for the 'skills' I mentioned previously, each micro-mounter develops his own techniques as he goes along. An ordinary book match cut diagonally is found to be perfect for cleaning and polishing minute xls. Yes, I said polishing. The right amount of pressure and a steady hand will put a gloss on many a dull xl. Just don't try it on acicular xls with basal cleavage. For removing stray bits of dust and debris a bit of lens tissue twirled to a point is far superior to the finest brush, for each piece is thrown away after one use, whereas a brush retains the dust and always leaves bits of it on the next specimen.

"I suppose that the work drawer of every micro-mounter contains an assortment of just about the weirdest tools and gadgets ever seen under the sun, including cork slicers, at least a dozen varieties of tweezers, pliers, awls, sailmakers needles and whatnot. The handiest of all are still the simplest. These are the ones you can throw away after one or two operations. Above all I sing a hymn to the common house pin. Is it bent out of shape or dulled in making one mount? Well, it has given its all in a good cause; into the wastebasket with it—there are plenty of fresh ones available just as long as you keep buying fresh shirts.

"One last tip: I always like a tidy mount. We used to call it 'policing the area' in my last line of business. Wherever possible it is a good thing to remove as many broken xls from around the perfect ones as you can. A mount that shows 2 good xls and the parts of 4 broken ones will be twice as good if a little careful pinwork is used to get rid of the junk. I have one mount showing 13 perfect benitoites and neptunites on matrix, with no trace whatever of any broken xls. No other collector — and I don't care if he has the finest museum specimen in existence — can make that claim."

THE INSIDE STORY OF TITANIA

National Lead Company Was the First to Produce This New and Brilliant Synthetic Gemstone.

By T. ORCHARD LISLE

When I wrote the article on Titania (or synthetic rutile) for the May-June issue of *"Rocks and Minerals"*, I was unaware that the National Lead Company, New York, also manufactured this brilliant gem. I have since been informed that many professional and amateur lapidarists consider that this company's product is finer than those described in my story. So, I decided to do a little investigating.

Consequently, I have learned that National Lead were the first to produce the Titania gem. Large rutile crystals of gem quality were produced in this company's laboratory as early as 1945 as an incident to a study of the titania crystal for pigment use.

Boules were only made by Linde after those of National Lead had been used for co-operative work in electronics and optics at the Naval Research Laboratory in Washington, D. C. Furthermore, one of National Lead's associated companies actually produced large rutile crystals as early as 1938, but the quality was not then high enough to arouse much interest for gem purposes. No way was known until later to prepare a crystal of sufficiently high purity to give the necessary brilliance and freedom from color caused by impurities.

While National Lead does not sell Titania boules to amateurs and collectors, it does supply a limited number of professional lapidarists and dealers from whom cut stones, and in some cases pieces of boule, can be purchased. The company is far more interested in the scientific uses of rutile.

List of Sources where National Lead Titania Gems may be Obtained.

Henry Schwab Lapidary, Inc.
100 West 43rd St.,
New York 18, N. Y.

H. R. Benedict & Sons
62 West 47th St.,
New York, N. Y.

Grieger's
1633 East Walnut St.,
Pasadena 4, Calif.

Sierra Gems, Inc.
105 N. Mountain Trail
Sierra Madre, Calif.

International Lapidaries Co.
600 Marlboro Road
Brooklyn, N. Y.

Pearson Gem & Jewelry Co.
310 Valle Vista Drive
Cucamonga, Calif.

William B. Schmidt Co.
Room 1020, 30 Rockefeller Plaza
New York, N. Y.

Titania gemstones cut from National Lead boules which I have since seen are lighter in color than those of Linde, being more nearly the water-white so sought after by collectors and amateur cutters. They also are harder, being 7 on Moh's scale, and have refractive index of 2.70. They also have extremely high dielectric constant. For scientific work they are valuable where a high reflective index is useful, such as in telescopic and camera manufacture. Distribution is still quite limited, so I guess you are lucky if you can get hold of a nicely cut stone, or a boule for cutting. National Lead does not produce synthetic rubies, sapphires, or spinel.

In order to make a comparison on behalf of interested amateur gem collectors, I obtained a National Lead Titania boule, and a friend of mine, Victor Pribil of the New York Iron Works, Long Island City, N. Y., agreed to cut a couple of gems. Victor is a mineral collector as well as a very enthusiastic gem cutter and polisher and, of course, is a member of the New York Mineralogical Club. Instead of trying to obtain a number of four or five carat stones from the boule, we preferred to get two good-sized gems. Victor ground the boule to a cylinderical shape, set it in plaster of paris, and then sawed it across the diameter witth a diamond saw.

Unfortunately, cracks developed in the two pieces, due to release of internal

stresses, so producing two large stones became out of the question. It appears that the makers recommend splitting the boule vertically into four pieces; but unless the boule is a large one of about 50 carats, large stones are not then possible.

I obtained another boule, and Victor also sawed this one across despite the warning. Fortunately, no flaws developed, and the result was most gratifying. One of the gems is of 16 carats, and now reposes in my collection, or rather in that of my wife's as I turn over to her all cut stones and cabochons, of which she has a fine collection. It is a lovely gem full of reflecting colors, and is quite light-colored, although not so white as the one which got damaged. To make sure that the very best had been gotten out of the stone I took it to the Hy. Schwab lapidary in New York for a final touch-up. His expert cutter changed the angles on the lower side with the result that it brilliancy was enhanced. It will hold itself proudly in comparison with any Titania of any other make. Being harder, it should wear better. Most gems sparkle the most under the electric light, but this Titania gives its greatest brilliancy in sunlight. At the first Fall meeting of the New York Mineralogical Club this stone will be shown to members.

COLLECTORS' COLUMN

Conducted by A. CAL LECTOR

BERYL

Beryl is a beryllium-aluminum silicate. It is the chief ore of beryllium, a metal ligher in weight than aluminum and yet possessing great strength. Beryl, when pure, contains 57% silica, 19% alumina, and 14% beryllium oxide. A beryl suitable for commercial purposes should contain from 10 to 12% of beryllium oxide. Some of the chief uses for the metal are for springs, high temperature valves, motor-brush holders, etc.

Beryl is a common mineral whose color is chiefly green or shades of green but blue, brown, colorless, pink, white, yellow are also known. It is found in crystals varying from tiny up to those weighing tons. At the Bumpus pegmatite quarry, in Albany, Me., beryl has been found in great six-sided log-like crystals of which the largest was 18 ft. long, 4 ft. in diameter and weighed about 18 tons (see "Huge beryl crystals at Albany, Me.", by E. K. Gedney and Harry Berman, *Rocks and Minerals,* Sept. 1929, pp. 78-80). Larger crystals than these, however, have been found in the pegmatite region of South Dakota.

Aside from being an ore, some varieties occur as beautiful transparent crystals, of which one, the emerald, is one of the most precious of all gems (ranking higher than a diamond). The finest emeralds are found today in Colombia, South America (see "Colombian Emerald Sources." by Ronald L. Ives, *Rocks and Minerals,* July-Aug. 1949, pp. 339-345).

The aquamarine, a bluish-green beryl, is another beautiful gem. Fine crystals of aquamarine have been found at Mursinka and Adun-Chalon (both in Siberia); in the gem mines of Minas Geraes, Brazil; in the Mourne Mountains of Ireland; Mt. Mica, Maine; at Haddam Neck and near Portland, Conn.; Mt. Antero, Colo.; in the gem mines of Pala and Mesa Grande, Calif., etc.

A beautiful rose-pink beryl has been found at Pala, Calif., and at Antis Rabe, Madagascar.

Beautiful transparent golden beryl crystals have been found at East Hampton, Conn.

A very pure, colorless, transparent beryl, called goshenite, has been found at Goshen, Mass.

All localities yielding gem crystals of beryl also yield the common crystals.

If your collection does not contain at least six beryl specimens, tie a string around your finger as a reminder that tomorrow, sure, you will RUSH an order for some to your favorite dealer!

CLUB AND SOCIETY NOTES

ATTENTION SECRETARIES—If you want your reports to appear in the Jan.-Feb. issue, they must reach us by Dec. 20th — The Editor.

Cleveland Lapidary Society
July Meeting

The Constitution of the Cleveland Lapidary Society provides for twelve meetings a year and to keep in line with this provision, we scheduled a meeting for July 12. The meeting was very well attended — 55 persons being present.

The principal speaker of the evening was Robert Tesmer who talked on the subject of Jade. Bob is a commercial cutter and his principal interest seems to be in Jade.—at least he knows more about it and sells more of it than any other person in the Society. His talk was very interesting and a great deal was learned as to location where materials are found, the kinds and quality of materials which may be purchased and values ranging from nearly nothing per pound to very high figures. Bob is also a poet of no mean ability and he prepared a short verse for this meeting.

August Meeting

Our President, Dr. Bacon, is in Utah with a group of Geology students from Case Institute of Technology. The meeting on Aug. 2nd., was presided over by past President Turobinski. This meeting was not scheduled with any particular subject matter but a variety of subjects kept the members busy for the entire evening.

We discussed a complete program for the coming year and passed out slips on which each member indicated their preference as to meetings and field trips. We also discussed the question of a field trip to Flint Ridge, which will be the first one undertaken by our Society since it was formed.

A number of members have returned from the Sacramento meeting and it was interesting to listen to their discussions of the meeting and side trips taken by these members. A large crowd was present even though no program was scheduled.

John M. Heffelfinger,
7619 Redell Ave.,
Cleveland 3, Ohio

N.O.T.S. ROCKHOUNDS
(China Lake, Calif.)

Of the many activities of the N.O.T.S. Rockhounds during the first six months of 1949, two trips to the Lead Pipe Springs area were most outstanding and successful. Many fine specimens of geodes and fire opal were collected in this area, a part of the Navy range facilities. Special permission was obtained for a total of 80 cars and approximately 300 people to accompany the N.O.T.S. Rockhounds on these trips. Members of clubs from Santa Monica, Long Beach, Pomona Valley and the Mineralogical Society of Southern California were included.

Other field trips have been conducted to Death Valley, Calico, Last Chance Canyon and the King Solomon mine at Johannesburg.

In addition to the field trips, monthly meetings have featured programs on Death Valley, speaker Sam Houston, Ranger; Owens Lake; speaker Dr. Gale, Head of Research, American Potash and Chemical Co.; Meteors, speaker, Dr. Nininger, American Meteorite Museum; local collecting areas, speaker Gale Chenard, Kern Co. mineralogist; Randsburg mining area, speaker Paul Hubbard, Randsburg editor and publisher; and a Geiger counter demonstration.

The Rockhounds furnished the central exhibit for a hobby show at N.O.T.S. The display included cases of local minerals, outstanding specimens, and cabochons. Demonstrations of cutting and polishing cabochons were given on portable lapidary equipment. Punch was served from the Rockhounds special punch bowl — a 400 pound geode from the Lead Pipe Springs area.

At the National Convention in Sacramento, member Ralph Dietz won a cup for his display of spheres, and Ralph Merrill won a cup for his display of miniatures, while the club was awarded a special ribbon for its newly sound produced picture "Rock Art". This 16-mm movie was prepared by the club to supplement the work of the club's lapidary shop by instructing the beginners in the art of cutting and polishing.

J. E. Snearly, President

Hollywood Lapidary Society, Inc.

The Hollywood Lapidary Society had a good attendance on their June field trip to the Palo Verdes Beach, while the weather was rather disappointing—apparently some of that high northern fog got down this way — it did not dampen the spirits of the 38 members and friends. Some good cutting material was obtained.

The officers elected for the coming year are:

Russel E. Kephart—President
Eric Stone—Vice-President
Evinita New—Treasurer
Recording Sec'y.—Gladys Entwhistle
Corresponding Sec'y.—Ruth Kephart

The Second Annual Show will be held October 15th and 16th, the place to be announced later.

Mrs. Ruth Kephart,
Corresponding Secretary.
1733 So. Crescent Heights Blvd.,
Los Angeles 35, Calif.

Georgia Mineral Society, Inc.

The regular monthly meeting was held on Monday evening, June 6, 1949. The main order of business was hurriedly dispensed with in order to defer to our speaker who was pushed for time; however this did not detract from the program as Mr. W. W. Simmons of the Tennessee Copper Company gave a very interesting and informative talk on the "Rocks and Minerals of the Ducktown Basin". His description of the past and present mining methods at Copper Hill, Tenn., was very interesting, and he pointed out that the mines at Copper Hill were the oldest or among the oldest continuously operated mines in the United States, mining having begun in 1838. One mine is now down to over some 400 feet below sea level and plans are to carry it still lower.

Mr. Simmons had with him some very interesting specimens of minerals from the locality and many members received excellent specimens of garnet, staurolite, pyrite and other minerals of the basin.

It was decided to adjourn the regular monthly meetings during July and August; however field trips and the Gem Section will continue on as usual; with a two day field trip planned for July to some North Carolina localities.

Gem Section Meeting

The regular monthly meeting was held on Monday evening, May 23, 1949, in the Blue Flame Room of the Atlanta Gas Light Company.

The Birthstones for June were the discussion subjects and, Miss Erna Mason and Miss Janie Morris turned in excellent performances as discussion leaders. They really did a fine job of preparation and presentation especially on Pearl and Moonstone.

There were plentiful specimens of rough material and cut stones brought in by various members.

After the meeting the usual grab bag was held and some nice stones of various kinds were obtained by the members. The grab bag promises to be a regular feature and a popular one. For one thing it allows everyone to obtain one stone a month at least which builds up their collection and also encourages swapping and trading among members.

July Meeting

The gemology section of the Georgia Mineral Society met on Monday evening, June 20, 1949.

Though the weather was threatening, a goodly crowd turned out to discuss the Birthstones for July — Ruby and Carnelian. Mr. Herbert L. Peterson was the discussion leader at this session and he turned in a masterful performance with brevity and to the point talk, centering mainly on the Ruby; however the Carnelian was not left out in the cold by any means. Mr. Peterson pointed out that both stones have had a long history and have been mentioned in very ancient writings, having held their own down thru the ages.

After the meeting the usual grab bag was held and the grab bag consisted of the famous Mount Mica tourmalines, everyone drew numbers and selected stones as their number was called and everybody was well pleased with what their number alloted them.

The next meeting will be held in July as usual even though the regular meetings have been adjourned for July and August. Mr. Charles Webb will be discussion leader at this meeting.

S. C. Knox
Corresp. Secretary
2142 Memorial Dr., S. E.,
Atlanta, Ga.

Southwest Mineralogists

The Southwest Mineralogists were indeed fortunate in having Mr. Victor Arciniega as their speaker for the July meeting. Mr. Arciniega's lecture primarily covered the identification of natural gem stones from their close rivals the synthetics.

Man-made gems are rivaling those made by nature. Sometimes even surpassing anything found so far, especially in the Emerald.

A workable knowledge of Crystallography and the optical properties of the six crystal systems to which all known gem stones belong is necessary for proper identification.

Mr. Arciniega's lecture was greatly appreciated by some of our members who have attended his classes, as it was a review of their previous studies.

The meeting closed with refreshments most graciously served by our Hostess, Mrs. Al Hake.

August Meeting

Mr. Albert Hake entertained Southwest Mineralogists at the August 9th meeting with colored travel slides and more of his marvelous mineral transparencies.

Mr. Hake has collected minerals for the past thirty years, starting with Moonstones along Redondo Beach, Calif. At one time his mineral collection was one of the most interesting in Southern Calif.

Mr. Hake then tried cutting and polishing Cabochons, and ended by owning an outstanding collection having won 60 ribbons, 3 cups, and innumerable other mementoes of various shows.

The past year and a half Mr. Hake has turned to mineral transparencies as a hobby, he now has 600 different patterns in his slides. About one in every five pieces of material cut is of sufficient color and transparency to transmit light. There are a few choice specimens in every location, however it is difficult to find reds and greens transparent enough. About 95% of material used is of the Quartz family minerals.

The meeting closed with refreshments served by our Hostess and her committee.

Connie Trombatore
Corr. Sec'y.
338 Pomelo Ave.,
Monterey Park, Calif.

Pacific Mineral Society

Again this year the society was at the head of the class in regards to the placque, they shared honors with Southern California Mineralogical Society of Pasadena for first place. Thirty-two members were present in their colorful "49er" costumes. The ladies topped their costumes off with a colorful blue and gold crepe paper sunbonnet.

A field trip was planned for July 24th, leaving Hemet at 9.30 for the collecting grounds in the Santa Rosa Mountains for specimens of andradite and cinnamon garnet, epidote, scheelite and sphene.

A regular meeting of the Society was held on July 8, 1949. On display were a collection of specimens brought back from the convention. Mr. E. R. Hickey had a group of specimens representing mineral locations from foreign countries and different sections of the United States that he had collected in the past year.

Mr. Jones introduced the speaker of the evening, Victor M. Arciniega, who was the first president of the Pacific Mineral Society. Mr. Arciniega is a prominent engineer in Los Angeles and at some time has given most of us our "schooling" in the Earth Sciences at Manual Arts Evening High School. When school is out we look forward to his annual talk to the Society. His talk this time was on the Geology of the Copper Deposits of the Morenci, Arizona District, where he spent many years.

Morenci has a population of 5,000, while in the early days it could boast of 15,000 population. In the early days there were three towns in this section, five miles southeast of Morenci was Clifton and on the north was Metcalf, which had a population of 4,000 and today it is hard to locate any traces of the town. From this section over 250 million tons of ore has been removed. In 1872 two brothers came from New Mexico and mined cuprite, with the nearest shipping point in Colorado. This section of Arizona exposes some of the oldest strata of dark blue schist, the same as that found in the bottom of the Grand Canyon. This pre-cambrian schist on the surface allows the minerals to be found near the top of the earth. Fossils have been found which indicates the area was at one time covered by the ocean. Nature made things easy for mining by furnishing a limestone mountain which could be used as flux in the smelter for reducing the ore. Some of the minerals found in this district are, cuprite, chalcopyrite, azurite, chrysocolla, malachite and pyrites.

When the mines were considered worked out, they were flooded and the water seeping downward picked up the minerals and the seepage was processed. They now mine 50,000 tons a day and at that rate can continue for there is a supply that will last for the next fifty years.

Mr. Arciniega is just waiting for the day when a certain church in Morenci will build a larger church at another location as the present building is located right on top of prize specimen material that was dumped and covered as there were not so many rockhounds in the early days to hi-grade the dumps for pretty rock that will polish.

August Meeting

The 45 members present for the August meeting of the Pacific Mineral Society enjoyed a very humorous lecture on "Mining Law" given by Victor J. Hayek, attorney and secretary of the Mining Association of the Southwest.

In the early California days during the gold rush, the laws were made to fit the occasion and would hold in one area and different laws would govern another section. The measurement for locating claims were one pick length and a shovel length along the stream and that width was carried up the side of the mountain and all the diggings for that claim were supposed to be kept within those boundaries. In 1872 the mining laws were revised and very few changes have been made since that time.

In 1848 the population of California was about 4.000 and by 1850 the population of the Mother Lode area alone was around 50,000. There was little need for money as gold dust and nuggets were used in payment of purchases. A sample of the prices from a menu—a dinner of sardines cost $16.00, with hard cheese at $3.00 for a half pound, a loaf of bread $2.00 and butter $6.00 a pound. If you wanted a roast beef dinner that was $1.50 and a potato to go with it was 25c extra. For dessert, rice pudding could be ordered for 75c and molasses over it was 25c extra. If one preferred a sauce that would be $1.00 extra.

When someone was brought before the judge for anything, the court fees and judge and jury were all paid in gold with a bottle of whiskey slipped along with it to pave the way for a light sentence.

Mr. Hayek vouched for all statements made during his talk even to the one about the tobacco chewing mule that would refuse to budge from the spot until someone would give him a chew of "cut-plug, then he would continue with his load of ore, chewing contentedly.

Of interest to all mineral-minded people is the government offer of $10,000 for anyone that can collect a 20 ton stock pile of 20% uranium by 1958. This offer holds good on any public lands with the exception of the Colorado plateau region.

M. Musselman
Box 463
Lomita, Calif.

Feather River Gem and Mineral Society

Like the application of a spark to a string of firecrackers, the acceptance of the Feather River Gem & Mineral Society by the California Federation this spring set off a series of

more activities than club members could handle.

On May 4 and 5 the Club displayed its "flowers of the mineral kingdom" at Oroville's 15th Annual Flower show, and the exhibit attracted more than 400 signed visitors, besides many others who besieged the various members in charge with questions of every kind about "rocks." The roving reporter of the local radio station, KDAN, who described all the exhibits, was much taken with Mrs. Pearl Parker's Montana agate butterflies.

An auction of gem minerals and lapidary supplies was held on May 15 by past-president Chas. A. Bush, for he has become a rovin' rockhound, and plans to cover a great part of the south- and north-west.

The Club's second annual potluck picnic and non-competitive show was held at Bidwell Bar Park on the 19th of June. Many and varied were the displays. Capt. J. D. Hubbard, Sec'y. of the Western Mining Council, pledged its support to all rockhounds, and C. A. Bush spoke on convention problems. Directories were issued as souvenirs of this occasion, and were sent to as many rockhound societies as possible.

Attendance of club members at the state and national federations at Sacramento in June nearly reached the 100% mark, even though President F. E. (Red) Rankin was on leave from the Mare Island naval hospital where he was undergoing treatment for a heart ailment, and vice-president Don Parker was forced to limp on a broken toe.

The photography panel of scenes in Oroville and on the Feather River which framed the club exhibit was graciously lent by the Feather River Camera Club, and the goldpanner was drawn by Mr. and Mrs. Douglas Ward. Dr. W. S. Westwood and C. A. Bush were official representatives at the state federation meeting, and Mr. and Mrs. Lee Reeves actively assisted the entire three days.

Several other bids for outside activities had to be turned down, but at least four more exhibits are scheduled for the next few months.

Field trips have included jaunts to Stony Creek for jasper, to Feather Falls for quartz crystals, and to Lake County for several minerals.

The above has been in addition to regular business and social meetings. In April Ass't. Ranger Wm. Ensbury of the State Division of Forestry showed two colored sound films on conservation: "And Then It Happened," the Maine holocaust of 1947, and "Blister Rust Control."

Ray and Don Parker presented the club with a laurel and Philippine mahogany gavel, shaped like a rock hammer, for use of current chairmen each year.

In June Mrs. Suzanne Snyder spoke on brucite, a mineral with which many of her listeners were previously unacquainted, and showed four types of it, the best specimen being on its way to Sacramento.

On July 14th, colored slides of the exhibits at the Sacramento convention were shown, along with other slides; and on July 28th, colored movies, accompanied by recorded music, were also shown by Mr. and Mrs. Lee Reeves. These movies were of desert wildflowers taken at the height of blooming this spring; Boulder Dam and Lake Mead, Death Valley, Catalina Island, and on up to Crater Lake, Oregon. This showing followed a short, informative talk by C. E. Snyder on "The Fundamentals of Mineralogy."

Door prizes have included the following: Oregon thundereggs, Brazilian agate, sagenite agate, chalcedony pseudomorph after coral from Florida, and two books: "A Book of Minerals," by Hawkins, and Poese's "Gem Stone Lore".

Many members are now on vacations, planning to go on them, or just returning from them; and they all seem to include plans for rockhunts.

(Exchanges of the club publication, *Feather River Reflections,* now equals members' copies, but Milwaukee remains the farthest distant point. We would like to achieve a trade with each and every club. Even if your club doesn't have a bulletin, but you'd like to be added to our mailing list, please let us know.)

Mrs. F. E. Rankin,
Corresponding Sec'y.,
Rt. 2 — Box 2105,
Paradise, Calif.

Pomona Valley Mineral Club

The Pomona Valley Mineral Club met at Claremont College on June 14 to hear B. W. Cohoon club member, speak on "Collecting Rocks on the Colorado Desert". Mr. Cohoon drew a map of the vicinity on the blackboard and pointed out where the various minerals could be found. Cuprite crystals, malachite crystals on quartz, and massive cuprite and malachite can be found slightly east of Blythe, Calif., within 50 miles of the city. Specular hematite and quartz crystals with specular hematite inclusions can also be found within the area. On Crystal Hill, near Quartzite, quartz crystals with inclusions and phantoms are found. Hollow quartz crystals and rhyolite are found at Horse Tanks. Many other collecting grounds were mentioned, where many specimens can be found. Mr. Cohoon spoke of the various mines of the vicinity and the minerals taken from them. He had many specimens to illustrate his talk.

Sterling Pugsley, also a club member, gave a humorous report on the recent field trip to Lead Pipe Springs. A polished opal nodule was displayed from this territory.

Verna N. Weist
Publicity Chairman
322A East B St.,
Ontario, Calif.

North Country Mineralogical Club
(Plattsburgh, N. Y.)

During February and March, it was voted to hold supplementary study and discussion meetings on the fourth Thursday evenings of

each month, in addition to the regular meetings on the second Thursdays. The second February meeting was held in the lecture room of the Plattsburgh Public Library, with three members of the Champlain College faculty demonstrating micro-chemical tests for the identification of minerals. By means of a micro-projector, Arthur Sandiford, assisted by Harold Benson and Ernest Stevenson, showed the effects of acids and other reagents on the minerals being examined. The color and shape of the crystal structures formed are the keys to their identification, Mr. Sandiford explained. The tests for lead, silver, and zinc were among the most striking of those demonstrated.

At the regular March meeting of the Club, Dr. Everett A. Manwell, of the Plattsburgh State Teachers College faculty, spoke on historical geology. Following a mimeographed chart on geologic eras and periods which he had prepared, the speaker gave a brief account of the evolution of the earth, as scientists have reconstructed it from evidence found in rock structures. His talk was illustrated by pictures and maps projected onto a screen.

The supplementary March meeting was held in one of the chemistry laboratories at Champlain College. Ernest Stevenson, of their faculty did further experiments on the chemistry of minerals. A large group was present to watch his demonstration. The evening was especially helpful, because Mr. Stevenson was so willing to answer questions at any point.

Harold Benson, of the Champlain College faculty, was the speaker at the April meeting of our Club. He continued the discussion of the chemistry of minerals. His talk was followed by practice in the identification of minerals in the Club's collection.

The first field trip of the 1949 season was held on May 1st, with its objective the old iron mines at Arnold Hill, near Clintonville, New York. Several carloads of people went on this expedition, including some new members. Many good specimens were found.

At the regular May meeting of the Club, the program included some study of the minerals in our cabinet collection. There was also a demonstration of the method of polishing minerals. Several of the Club members have taken up this hobby during the past winter.

Another field trip was held on Sunday, May 29th, to the ore dumps of the Republic Steel Corporation's mines at Lyon Mountain, New York. Here samples were found of hornblende (which showed good cleavage), feldspar, magnetite in large quantities, light-colored calcite, and crystalline asbestos.

Regular meetings will be held during the summer, and further field trips are being planned.

Gertrude E. Cone,
Secretary
Keeseville, New York

Michigan Tech Rock Knockers

A geology club has been revived at the Michigan College of Mining and Technology, Houghton, Mich. The original club was started a number of years ago but has lain dormant for some time.

The revived Club, The Michigan Tech Rock Knockers, has had a very encouraging first year and envisions great things for the coming years. In the course of the past year, the Club has had many enjoyable programs at its meetings and has instituted a gem cutting class.

The officers for the first year, of the Rock Knockers, are:

President—Joseph A. Mandarino
Vice-President—Arthur J. Myers
Secretary-Treasurer—Philip C. Ellsworth

Mr. Mandarino is a member of the R.&M.A.

Newark Mineralogical Society

The 265th regular meeting of the Newark Mineralogical Society was held Sunday, May 1st, at 3 P.M., in the Newark Museum Addition Lecture Room, Newark, N. J.

The program for the afternoon was a discourse by Roy M. Allen Sc. D. of Glen Ridge, N. J., on "Getting Acquainted with the Feldspar".

Mr. Allen gave a very complete talk on feldspars, covering the whole family groups of the potassium, sodium and calcium feldspars. He started with a description of the crystal system and the axes of each crystal. To illustrate, he had six large crystals of transparent plastic which he had made and drilled from corner to corner, to show the different axis of each crystal. These transparent blocks helped one to understand the principles of the axis.

Gradually he concentrated on feldspars and their own special characteristics, such as composition, twinning, streak, luster, color, hardness and crystal systems, which are monoclinic and triclinic.

Mr. Allen spoke of the commercial values of feldspar, the semi-precious stones and how potters prefer the Albite feldspar to all others for making fine porcelain enamels, because they fuse more readily.

A lively question and answer period followed and after awhile Mr. Allen begged to call it a day, having been on the platform a long time and having covered the subject thoroughly.

Herman E. Grote,
Publicity Chairman.
95 Lenox Street,
Newark 6, N. J.

East Bay Mineral Society

Our new president, Gerould (Jerry) Smith, really started his term of office with a rock splitting bang. Aided by his field trip scouting personnel, headed by Rex Hawkinson, arrangements were made, through the good graces of the Henry Kaiser Co. to take over

their Quarry near Orinda, California, for their field trip of July 10th.

Forty cars of enthusiastic rock hounds were on hand to take advantage of the unusual opportunity to explore this working quarry, which is part of an undersized mountain situated on the tunnel strip between Oakland and Walnut Creek.

The old dirt road to the summit affords a magnificent view of the surrounding oak-studded hills and an unsurpassed picture of the "Old Devil" Mount Diablo reminiscent of the early quicksilver mining days. Its rugged deep blue outline, and mauve tinted highlights etched against a warm yellow sky as the sun was breaking over the horizon, making a picture no rock hound will soon forget.

The clank, clank, of hammer and pick were evidence that the dark objects moving about the countryside with a ding dong motion were members of a society who were curious and anxious to gain a little more knowledge of the earth's science by digging for them. Specimens taken were nice green Agate, Ferrous Iron, cubes of Pyrite, Quartz crystals—three sided and hollow.

Sunday, August 14th, the Society pilgrimaged to the New Almaden Quicksilver Mines. Thirty-five cars made up the caravan. The weather was exceptionally pleasant, members filled their sacks with fine specimens of Cinnabar, Calomel, Serpentine and Eglestonite, and a few specimens of native Mercury in place. The bulging bags were laid aside for the bulging feed bags, as picnic time approached.

As a weary "Pick-Nicker" remarked, "By Jasper, a rock throwing contest would have lightened the load on the home stretch."

Gordon White
Corresponding Secretary
P. O. Box 1196,
Oakland, Calif.

North Jersey Mineralogical Society

The North Jersey Mineralogical Society, whose meetings are held in the Paterson Museum, Paterson, N. J., now boasts a membership of 113. Its programs are intensely interesting so that meetings are really phenomenal.

A new feature has been introduced in the meetings which is destined to be very popular. This is "The Fifteen Minute Study Period." The leader of this feature sticks right squarely to the 15 minutes and stops when the time is up. At the June 9th meeting, Mr. William C. Casperson, Curator of the Paterson Museum and President of the Club, was the leader of the Fifteen Minute feature. Mr. Casperson had prepared for free distribution copies of a paper titled "Minerals" (printed elsewhere in this issue) and the 15 minutes were devoted to questions and answers on any subject pertaining to minerals.

Chicago Rocks and Minerals Society

Herbert Grand-Girard was unanimously elected President of the Chicago Rocks and Minerals Society at the June meeting at which time the annual election of officers was held. Mr. Grand-Girard has been Editor of the Society's publication the "Pick and Dop Stick" to which he has tirelessly and very competently devoted his time through the past several years. He is one of the Society's staunchest supporters and his endeavors on its behalf have been most sincere.

The following officers were also elected:
Vice-Pres. — J. W. Pagnucco
Recording-Sec'y. — Marie Hóltz
Treasurer — Louis Holtz
Corresponding-Sec'y. — Helen L. Cooke

Curator-Historian — Geo. C. Anderson
Editor — Oriol Grand-Girard
Co-Editor — Alice Wollin

Mr. Geo. C. Anderson, past president of the Mid-West Geological Societies, has been ill and under doctors care. We have missed not seeing him at the meetings and also his enthusiastic cooperation which has been of great value to our Society.

The evening's entertainment was contributed by Miss Gloria Johnson who told of her experiences and thrills on a trip to Alaska via the Alcan Highway. Her movie titled, "Two Girls Drive to Alaska" was very much enjoyed.

Regular monthly meetings have been adjourned for the summer. The first next regular meeting will be the second Saturday in September.

Helen L. Cooke,
Pub. Chairman.
2952 N. Lavergne Ave.,
Chicago, 41, Ill.

New Jersey Mineralogical Society

The Society meets on the 1st Tuesday of the month at the Public Library, Plainfield, N. J.

The following new officers were elected in June:
President—Neil A. Wintringham
Vice-President—Carl A. Bieling
Vice-President—L. A. Murphy
Secretary-Treasurer—Ross F. Horn
Ass't. Sec.-Treas.—R. O. Wilbur

Board of Directors

To 1953—G. Raymond Stilwell
To 1952—Robert R. Goodrich
To 1951—Joseph D'Agostino
To 1950—Paul Robinson

Honorary Members

Dr. Chas. Palache — Dr. Marcel Poochan
Dr. A. C. Hawkins — Gen. J. S. Hatcher
Dr. W. F. Foshag

Ross F. Horn,
Sec.-Treas.

Wisconsin Geological Society

The Wisconsin Geological Society closed its season's activities with a banquet, held May 14, 1949 at 6:30 P.M. in the banquet hall of the Y.M.C.A.

The guest speaker of the evening was Mr. Carl E. Dutton of the U. S. Geological Survey, of Madison, Wisc. He spoke on Colorful Glimpses of Northern Michigan well illustrated with kodachrome slides.

The new officers for the coming season installed at the June meeting are:

Andrew Haynes—President
Gilbert Hill—Vice-President
Carl Hub—Treasurer
Elizabeth Wilhelm—Recording Secretary
Helen Porter—Corresponding Secfetary

Directors:

Max Jaehnert
Wm. C. Dittman
Oliver Lex
Trilobite Editor: Conrad Oakland

Elizabeth Wilhelm
1919 N. 33rd St.,
Milwaukee 8, Wisc.

The Los Angeles Lapidary Society

The Los Angeles Lapidary Society held its monthly meeting July 11th at the Ebell Club, 1717 West 47th St., Los Angeles, Calif. Its newly elected President, Victor Gunderson, wielding the gavel. Questions by Jack Gaston and answers by the members was the program and furnished entertainment in an educational way.

The seventh annual Show and Picnic being held Sept. 24th and 25th was discussed, while a show case of beautiful drawing prizes was displayed for the approval of visitors and members.

August Meeting

Mr. Victor Arciniega, Mining Engineer and Teacher of Crystallography in Los Angeles Public Schools, presented a very interesting and informative lecture at the August meeting of the Los Angeles Lapidary Society. His subject was "Location of Gem Stones in California." This most informative program rekindled the prospecting desire of every listener.

Ted Schroeder,
Corresponding Sec'y.
8916 So. Manhattan Pl.
Los Angeles 44, Calif.

COMBINED CONVENTION MEETING A HUGE SUCCESS

The combined convention meeting of the American Federation of Mineralogical Societies and the California Federation of Mineralogical Societies, held at Sacramento, Calif., on June 24-27th, 1949, was a huge success. Due to the splendid cooperation given the convention by mineralogical magazines and the press, a large number of visitors were in attendance.

Convention Information

The attendance was 12,000. This included registered members, paid admissions, delegates and officers, dealers and their personnel, and distinguished guests.

Officers of the California Federation 1949-1950

Jack Streeter, President; Robert Deidrick, Vice-president; Ilga Hinsey, Secretary; Modesto Leonardi, Treasurer.

Officers of the American Federation 1949-1950

Jack Streeter, President; Don Major, Vice-president; Dr. Junius Hayes, Secretary; Oscar Anderson, Treasurer; Dr. Ben Hur Wilson, Historian.

Dealer Display Awards

Best Dealer Jewelry Display — Conley Company.

Best Lapidary Machinery Display — Highland Park Lapidary.

Best Mineral Display — Oscar Gisler.

Award List

CRYSTALS

Single — 1 Cup.
1st—Earl Calvert
2nd—Charles Hansen
3rd—Ralph Merrill

Groups — 1 Cup.
1st—Charles Hansen
2nd—Mrs. Jessie Hirsch
3rd—Miss Marjorie Welch

LOCALITY GROUPS

1 Cup.
1st—Vincent Morgan
2nd—William Oke
3rd—Ralph Merrill

FAMILY GROUPS

1 Cup.
1st—George Higson
2nd—Mr. H. R. Straight
3rd—Mr. I. L. Marriott

MICROMOUNTS

1 Cup.
1st—Mr. William Oke

FLUORESCENTS

1 Cup.
1st—Mrs. Jessie Hirsch

PERSONALLY COLLECTED
1 Cup.
1st—A. G. Ostergard
GENERAL MINERALS
1 Cup.
1st—J. B. Nichols
2nd—Mrs. Dorothy Craig
MINIATURES
1 Cup.
1st—Ralph .errill
2nd—Mrs. Helen Parnau
EDUCATIONAL EXHIBIT
1 Cup — Radio Active—Jack Streeter
1 Cup — Gold Specimens—Chuckawalla Slim
1 Cup — Fossilized Insects—J. R. Mathieu
MINERALS
Best in Show — 1 Cup.
Charles Hansen
BEST SOCIETY MINERAL DISPLAY
1 Plaque — Tie
Pacific Mineral Society
Mineralogical Society of Southern California

Award List — Lapidary

FLATS
Bookends—1 Cup
1st—Major Kennedy
2nd—Ocie Randall
Transparencies—1 Cup
1st—P. P. Eitzen
2nd—George Higson
Sections—1 Cup
1st—Ira E. Woolley
2nd—Mrs. Gladys Gilmartin
Special Award—Mrs. Jessie Hirsch
CABOCHONS
Quartz—1 Cup
1st—G. P. Gibson
2nd—(Sequoia)
3rd—Leon Dial
Non-Quartz—1 Cup
1st—G. P. Gibson
2nd—W. H. Russell
Mixed
1st.—R. W. Carpenter
2nd—(Oregon)
FACETS
No entry
NOVELTIES
Practical—1 Cup
1st.—W. C. Barnes
2nd—(Orange Belt)
3rd—W. H. Hall
Ornamental—1 Cup
1st—Lee Unruh
2nd—Mrs. Genevieve Colony
Spheres—1 Cup
1st—Ralph Deitz
2nd—J. R. Mathieu
MOUNTED STONES & JEWELRY
1 Cup
1st—Lloyd Roberson
2nd—E. F. Tuttle
GENERAL LAPIDARY
1 Cup
1st—J. H. Kennedy
2nd—C. H. Yoder
BEST SOCIETY DISPLAY IN SHOW
1 Plaque
Gem Cutters Guild
NON-MEMBER
Useful Novelties—1 Cup
J. W. Anderson
EDUCATIONAL FEATURE
Special Award
N. O. T. S.
NON-MEMBER PARTICIPATION
Special Award
W. A. Yongue
Special Award
Frank Crandall
Special Award
H. L. Hayes

JUNIOR AWARDS DIVISION

LAPIDARY
1 Cup
1st—Billy MacClanahan
2nd—Don Oser
3rd—Joe Lindsey
MINERALS
1 Cup
1st—Larry Ford
2nd—Don Oser
3rd—Billy MacClanahan

GOLD PANNING

SOCIETY MEMBER ENTRANT
1 Cup
Robert D. Roots, Colorado
MOTHER LODE ENTRANT
1 Cup
Edward H. Combs

SERMONS IN THE ROCKS

By CONSTANCE P. TROTT
36 Mt. Vernon St., Gardiner, Me.

Not long ago I wrote to a collector in New York whose name had appeared in *Rocks and Minerals,* asking him if he would be interested in an exchange. His reply was prompt and friendly, and almost as soon as his letter made port a box arrived, filled with exquisite specimens from a well-known New York quarry.

I was overwhelmed, and sat up till midnight composing a letter of appreciation and packing up a box of my best Maine specimens to send back posthaste.

In two weeks time an exchange had been made, and as far as I know both parties were delighted.

What makes mineral collectors the way they are? I have collected one thing or another since I could toddle, and in any other hobby in which I was ever engaged, the general idea seemed to be to get the most and best as soon as possible. Grab was the password and envy the secret motto. And proud was the possessor of an item nobody else could get!

Minerals just don't work that way, and neither, apparently, do mineral collectors. When I acquire a new selection I can't hurry fast enough to rush some to my collector friends. It is true that I might not feel that way if they were not continually rushing something to me. But they are; and that is why I ask what makes mineral collectors the way they are.

Perhaps a reason is that one has to get so close to the Earth, so near to the Beginning of Things, to add to his collection. Here in Maine there is something soul-satisfying in sprawling on a mountain-top, digging in the ground, with the sky so near and the rest of the world so far away. It is an exhilerating thought that the next thrust may bring forth that particular something one is seeking.

And it is wonderful, though back-breaking, trudging back down the trail, loaded like a couple of burros, trying to ignore specimens one treasured coming up and laid aside to be gathered up on the way down. Knees buckling, it is heaven to reach the car and the thermos of hot coffee waiting at the end of the trail (which has somehow lengthened itself by at least two miles!)

Then why does one dash so madly upon arrival home for boxes, stamps, and tissue paper, and proceed to send away nearly everything he has so painfully acquired

Ask me another!

Perhaps the explanation lies in the fact that minerals are everywhere. They are not man-made; not priced, stamped, or limited. One never knows when a new quarry or mine may open up new wonders and possibilities. Nature is so much more prolific than man — and so much more original! As one collector remarked upon sending me a lovely specimen of clear selenite enclosing delicate crystals: "Makers of plastics take pride in their ability to enclose objects in transparent plastic; Nature has been doing it for thousands of years!"

There is something purifying, something uplifting in this collecting of minerals; which cannot be found, as far as I can see, in any other kind of collecting. It opens the hand and the heart. I have felt its contact, and so, I believe, have others; for those with whom I have exchanged have been only kind and generous.

Someone said that man could read his sermons from the rocks. This might mean one thing to the geologist; but the historic tales the rocks could tell to me are in a strange language, for I know little of geology — as yet.

I have never analyzed my feelings regarding them. I suppose if I should, and translated their sermon, it would run something like this:

"Don't hurry; don't hurry. Time is not here. We existed long before you and your kind; we shall exist long after you and your kind are gone. We are not man-made; we cannot be possessed. The Hand that made us is never still. Don't hurry."

